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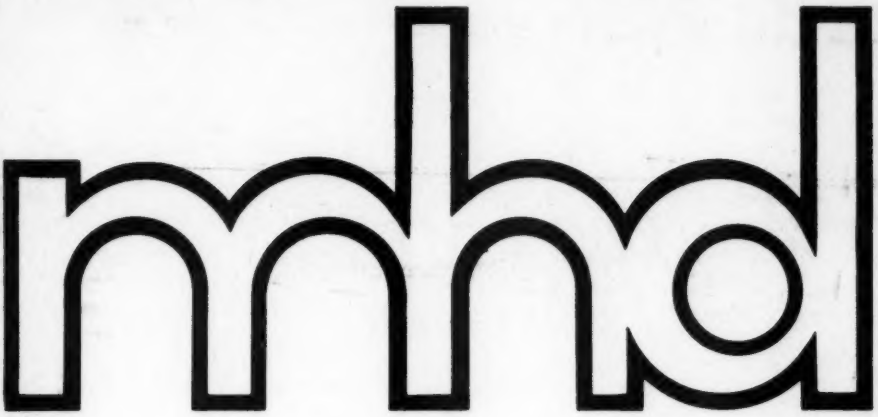

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The *Mental Health Digest* is a monthly publication designed to reflect the whole spectrum of mental health and to present a broad sampling of scientific subject matter and professional points of view. It contains condensations of material selected from the current mental health literature. The condensations are published with the approval of the authors and publishers for use in the *Mental Health Digest* only. Readers interested in particular digests are urged to consult the journal or other source in which the material first appeared or to ask the authors for reprints.

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Research on Marihuana

As marihuana has become a popular psychoactive substance it also has become a focus of medical, legislative, and law enforcement controversies. Now it is used by substantial numbers and varied segments of our population, yet there are many unanswered questions about the somatic and psychic effects of marihuana. Since 1968 the National Institute of Mental Health has sponsored an intensive research program to examine the implications of marihuana use for the American people. Now that research program is bringing to light new knowledge and is evolving new questions about marihuana. More and more research findings are appearing in journal literature, and the scientific community gradually is unfolding details about the biochemical actions and the hallucinogenic effects of marihuana as well as about the sociopsychological factors surrounding its use.

This issue of the *Digest* features some examples of the variety of marihuana research projects that have been sponsored through NIMH along with a summary of the background and recommendations of the Second Report of the National Commission on Marihuana and Drug Abuse.

The Second Report of the National Commission on Marihuana and Drug Abuse: Background and Recommendations

Dana L. Farnsworth

The main recommendation of the first report of the National Commission on Marihuana and Drug Abuse addressed the desirability of removing criminal penalties for personal, private use of marihuana but discouraged its use.

During the past year the National Commission considered all aspects of the drug problem in the United States, with less emphasis on marihuana. About 60 monographs and studies are scheduled to be published following publication of the main report. Members of the Commission traveled and investigated the drug problem in 36 countries, particularly in England, Holland, France, Italy, Lebanon, Germany, Afghanistan, India, Vietnam, Hong Kong, Australia, New Zealand, Japan, Jamaica, and Mexico. Practically all these countries have a drug problem, but none is as serious and widespread, or as well publicized, as the problem in the United States.

Defining the Issues

The meaning of *drug* varies depending on who uses it and where it is used. Strictly speaking, a drug is a chemical compound other than food which when taken into the body changes in a chemical manner the physical or mental state. *Drug abuse* has come to be a symbol for social disapproval, and is often considered to be any drug use of which an individual disapproves. Instead of concentrating on drugs or definitions of drug abuse, the Commission decided to focus on the relative risks and social consequences of the various patterns of drug-taking behavior.

The term *narcotic* has departed from its technical definition and has been used to denote substances which were basically undesirable. Whereas the narcotics policy had been identified with underprivileged minorities, criminals, and social outsiders, the drug problem of the 1960's was identified with another group: the children of the middle and upper classes. Now drug use was associated with unfamiliar life styles, youthful defiance of the established order, emergence of a street culture, campus unrest, communal living, protest politics, and political radicalism.

American drug policy has been predicated on one notion: that the societal objective is to eliminate nonmedical drug use. Little attention has been paid to whether this goal is desirable or possible. One reason for societal disapproval of nonmedical drug use is the idea that individuals should not risk their health by using drugs. This is highly debatable. Society has been aware of the individual and social risks carried by the use of alcohol and tobacco, but these substances are permitted and available. Society subordinates the risk in such behavior, deferring to individual judgment.

If information about risks and moral persuasion are insufficient to convince people not to use drugs, it is assumed that the threat of criminal sanction will do so. This does not appear to be true. Possession offenses are no longer supported by strong social consensus, and the emerging ambivalence is reflected in the behavior of

police, prosecutors, and courts.

Anyone choosing to use drugs in spite of risks, persuasion, and threat of criminalization is often considered abnormal, emotionally ill, and weak of character. In the last decade legislative opinion has swung toward the belief that drug dependence, and drug use, is a "medical" problem, that it can be "treated" and the user "rehabilitated." The public has been led to believe that drug dependence is as definable and treatable as ordinary maladies. But there is not at present any known cure for drug-dependent persons, although they may be helped by a variety of counseling and other procedures.

All levels of government have been pressured into action. The result has been the creation of larger bureaucracies and expenditures of monies, and an outpouring of publicity so that the public will know something is being done. In the course of well-meaning efforts to do something about drug use, society may have institutionalized it as a never-ending project.

The Commission believes the present policy should be made more coherent and flexible.

In the Commission's view, programs oriented solely to drugs are unlikely to serve us well. Education should integrate information about drugs and drug use, including alcohol and legal drugs, into broader mental health or problem-solving courses. The objective of encouraging responsible decisionmaking can be emphasized without placing the teacher in the position of defending drug policy or of persuading students to comply with it.

A secondary aim must be to discourage use of drugs for self-defined purposes, or to remove those institutional and social pressures which motivate an individual toward such use. It is also desirable to focus attention on human needs and on the urgency of developing satisfactory nondrug alternatives.

Drug-Using Behavior in the United States

Throughout history man has used psychoactive substances to seek relief and to gain pleasure. Chemically induced mood alteration is taken for granted and accepted in American society, but the degree of acceptance depends on the source of the drug, the reason for its use, and whether or not its use is supervised. Self-medication is approved when it involves alcohol, tobacco, previously prescribed drugs, over-the-counter drugs, or coffee. But experimentation by young people is not frequently approved, especially when they experiment with hallucinogens, stimulants, and opiates. Young people view the attitudes of older people as hypocritical: If older persons have their drugs, there is no reason why young people cannot have their own.

Some kinds of addiction are in disrepute, and the addicts are rejected by the majority of people, including those who care for them. The narcotics addict, alcoholic, and "freak" may find that they are not as welcome in emergency facilities as those who have more respectable disorders. This has contributed to the rise of crisis intervention centers where there are no criteria for treatment.

Alcohol is the most frequently used drug. Marihuana use apparently is not increasing significantly, except in the age group of 18 to 21. Youthful drug use is most common in the Far Western States, in urban centers, and among white people.

To determine the nature and extent of drug use among secondary school and college students, the Commission developed access to approximately 200 student surveys with about 900,000 respondents. In this group more than

half had used some drug in an experimental way, a dramatic increase since the late 1960's. Alcohol and marihuana are the most popular drugs, with other drugs gaining on them. Opiate use is low and may be stabilizing or diminishing. Most high school and college students have not used opiates, inhalants, hallucinogens, stimulants, or depressants and do not intend to do so. Alcohol, on the other hand, is acceptable to most students, and many expect to use it in the future.

The major concern about health is the effect of repeated administration of a drug over a long term. The risk usually consists of death due to overdose or of psychological trauma. As a result of chronic use a person may become more aggressive or passive, less adept at muscular control, or may deteriorate mentally and become incapable of engaging in voluntary learning efforts. Drug-dependent persons tend to drop out of usual activities rather early, forming a distinct loss to society. Individual and public safety matters include crime due to loss of impulse control, stealing to support the drug habit, risk of operating motor vehicles, and impaired judgment in general.

Drug use may be placed on a continuum of experimental, social or recreational, circumstantial or situational, intensified and compulsive. In this scale the risk to the individual, to society, and to public safety increases as one ascends it. A rational drug policy would put emphasis on trying to minimize the intensive or compulsive use, even though all unsupervised use should be discouraged.

The Social Impact of Drug Dependence and Drug-Induced Behavior

Freedom of the will is valued in Western society, and drugs are commonly thought to interfere with the exercise of free will. However, drugs used to minimize the effects of unwilled behaviors stemming from mental illness or aberration may restore the capacity for responsible, willed behavior.

Drugs may also deprive a person of control over his conduct. Such loss of control is undesirable and results in irresponsible behavior. American law has been ambivalent about whether a person should be held accountable for such behavior, reflecting the tension between freedom of the will and human limitations. The possibility of drug-induced behavior is what distinguishes drug use from other forms of behavior, and what has motivated all societies to regulate it. A unique expression of drug-induced loss of control is the individual's inability to stop using the drug.

While drugs affect behavior, they do not do so uniformly. Nondrug factors play a crucial role in determining the behavioral consequences of drug use. Characteristics of the user, his expectations about the drug experience, the setting in which the drug is used, and sociocultural factors are important in determining drug effect and the degree to which the individual can control the effects through the exercise of his will.

The term *addiction* is usually applied to that condition in which the person has a compulsion to continue taking the drug and to obtain it by any means, a tendency to increase the dose, and a psychic and physical dependence on the effects of the drug; it implies a detrimental effect on the individual and on society. *Drug habituation* or *drug dependence,* however is characterized by a desire but not a compulsion to continue taking the drug, little or no tendency to increase the dose, and some degree of psychic dependence on the drug's effect but absence of physical dependence; the detrimental effects are primarily on

the individual. The term *drug dependence* is being used to include addiction and psychological dependence.

In a sense, a person is dependent on innumerable habits. This is an advantage when applied to persons, associations, and customs which further the individual's desires and goals and do not harm others. Degree of dependence can only be measured by looking beyond the behavior itself to its role in the individual's existence and to the nature of the adjustments which would be made if he could not behave in the way on which he has come to depend. Drug dependence in its broad sense involves most of the world's population in one way or another; consequently, drug dependence should be viewed as a continuum starting from a low degree of dependence to total preoccupation with drug-using behavior. Eliminating drug dependence would be impossible. Social policy should reflect the complexity and relativity of dependence and should be directed toward minimization of drug-dependence forms which threaten the greatest harm to the individual and to society.

The major drug-dependence problems in the United States are alcohol and heroin. Present use patterns of barbiturates and cocaine do suggest, however, that the prevalence of intensified and compulsive use may increase in the immediate future. Therefore, major emphasis should be placed on heroin and alcohol, while preventive responses should be directed toward the barbiturates and cocaine.

Drugs are of public health concern, especially when the method of administration and use involves contact with other diseases. Hepatitis, acute and toxic reactions, infectious endocarditis, tetanus, and tuberculosis are associated with massive drug use. The leading cause of death in persons aged 15–35 years is related to heroin dependence. Overdoses that result in death are not clearly understood, but they are frequent. The public health considerations for drug use are very real and immediate, and it is in this area that educational efforts are greatly needed.

It is difficult to establish a relationship between crime and use of drugs, but there is no question that the two are related. Which comes first, drug use or criminal behavior, is under debate; evidence, however, has been accumulated that criminal activity begins before involvement with drugs. As a general rule, the ability of drugs to exacerbate existing psychopathology, delinquency, and criminality is conditional upon the preexistence of psychological and social maladjustment prior to the onset of drug use or dependency.

Toward a Current Social Policy

Those charged with formulating drug policy face a dilemma. Drug-taking usually falls within behavior that has been designated private. On the other hand, a free society must protect the health, safety, and welfare of the whole. Conflict comes when the level of irresponsibility threatens to rise beyond the point of social tolerance. That is the situation which we now face in dealing with misuse of drugs.

The adverse impact of drug use on the social welfare has at times been exaggerated. Many psychoactive drugs can be used by mature, stable persons in a structured, moderate manner without harm, but history demonstrates that widespread exposure of a populace to psychoactive substances exacts a heavy social cost. The policymaker must try to combine both points of view—the private and the public.

The primary goal of drug policy must be to minimize irresponsible

drug-taking behavior. Use of drugs is irresponsible when it induces behavior posing a threat to the safety or welfare of others; when it impedes or risks the impairment of the individual's integration into the social and economic system; and when it is excessive or indiscriminate. Social policy should discourage use of drugs for self-defined purposes or should minimize institutional and social pressures which motivate an individual toward such use. Social policy should incorporate the ideal of drug-free living.

However, a policy of discouragement must be blended with tolerance for those who turn to drugs. A free society must assume that its emotionally mature citizens can be trusted to make responsible decisions regarding drug use, and institutional energy should be directed toward influencing the context within which the individual's decision is made. Social policy stimulates individual decisions to leave drugs alone by developing resources to diminish the pressures that motivate people to use drugs. Policymakers should focus on those social, economic, and cultural factors which make particular populations vulnerable to excessive or indiscriminate use and seek to minimize conditions which encourage drug-using.

The public rarely considers misuse of drugs that can be obtained legally as drug abuse. The Commission decided that the formulation of a coherent social policy requires consideration of the entire range of psychoactive drug consumption, including alcohol and tobacco. But no major change will occur until we can internalize our goals as a society. This means that we must live up to our ideals and deal with the underlying needs and causes which have activated drug-taking on such a grand scale.

By including alcohol use and self-medication with any drugs within a framework of discouragement and responsible choice, drug policy can promote development of sounder belief toward these behaviors. An emphasis on prudent decisionmaking will alert physicians, clergy, pharmacists, psychologists, teachers, and others to whom individuals look for information and support to the importance of assisting the individual in understanding his needs and his responsibility for his decisions and their consequences. There should be an attempt to focus attention on human needs and on the urgency of developing satisfactory solutions without the use of drugs. When drugs are less often regarded as villains, they are less likely to be regarded as panaceas.

The major thrust of policy should be to minimize the incidence and consequences of intensified, compulsive use patterns. A second step is to determine those conditions under which psychoactive substances should be legitimately available. The utility of controls rests not only on their effectiveness but also on their cost. The evidence favors retention of the present system, with a few adjustments in the level of control of certain drugs.

Reliance on law is unlikely to be effective unless it is joined with other institutions of social control. Formal social efforts should be directed toward those behaviors which are not adequately controlled by informal mechanisms of social control. The Commission hopes to provide a plan of action to be implemented immediately. It believes that a coherent social policy requires a fundamental alteration of social attitudes toward drug use and a willingness to embark on new courses when previous actions have failed.

Looking Ahead

While this country should continue

to discourage any drug use outside medical channels or established social patterns, concentration of attention and effort must be on disruptive use behavior. The social response should include attention to the lawful but irresponsible use of substances such as alcohol and barbiturates, realizing that the structure of the drug program cannot be changed overnight.

The most important desirable change is a reinvolvement of the private sector and the reactivation of informal, nonlegal controls on drug-using behavior. School, church, family, business, community organization, service organization, each working from its own perspective and values, will have to encourage the development of self-discipline with regard to drug use. The primary thrust should be to guide the individual to some other solution to his problems. In fact, there is no reason why prevention programs should emphasize drugs at all.

Physicians must exercise greater restraint in prescribing drugs that are psychoactive. and patients must recognize the limits of drug use.

Law enforcement against illegal supply can assist only to a degree. Emphasis must remain at the other end of the problem: the demand. In dealing with people who have used drugs inappropriately, restraint or deprivation of liberty should be reduced to the minimum amount consistent with maximizing therapy or counseling.

The religious community has a major responsibility for the philosophical, moral, ethical, and spiritual questions. A more basic role for the religious community, however, lies in dealing directly with the many issues of private moral choice which are outside the realm of social policy.

The private institution with the greatest potential for positive impact on drug use by the young is the family. Any policies regarding drug use and drug dependence must include the family as an integral part of the response.

Throughout the report the Commission emphasizes the necessity of keeping all options open and making changes in remedial programs whenever indicated. Because of the tendency to develop institutions which become semiautonomous in their own right, the Commission believed that it would be desirable to have another group evaluate the situation in 4 years to see whether or not major changes are desired. It would be the duty of such a Commission to evaluate the social response to drug use during the preceding 4 years, consider the results of the programs, recommend to Congress whether the present agencies should be continued, dissolved, or modified, and propose new policies, programs, and techniques. The major goal should be to begin the final deemphasis of the drug problem and its reintegration into the larger framework of human resources policy planning.

The Commission made more than 150 recommendations directed to various institutions, professional groups, and individuals. We will summarize those which are of particular interest to psychiatrists and other professional groups.

Part I. Public Institutions

Government Organization

Federal

1. Congress should create a Single Federal Agency, which might be called the Controlled Substances Administration, to establish, administer, and coordinate all drug policy at the Federal level and to be the principal, if not sole, point of contact with the

State drug programs. The Single Agency would remain separate from other Federal departments and agencies and be responsible for its organization and fiscal management.

2. The Single Agency should have the authority and capability to: distribute and monitor grants to States for drug-dependence treatment, rehabilitation, prevention, education, and law enforcement programs; coordinate all substance-related programs which remain external to the agency itself, such as those of the Department of Defense and the Bureau of Prisons; maintain and monitor an ongoing collection of data necessary for present and prospective policy planning; develop and implement a general research plan, including evaluation of federally funded drug programs.

3. The Single Agency would absorb the functions concerning drug programs now performed by all the Federal agencies.

4. To avoid institutionalizing the drug "problem," the concept and accomplishments of the Single Agency should be reexamined 4 years after its creation; and the agency, by law, should disband within 5 years, its surviving components being reassigned to the agencies or departments from which they came (or into other more appropriate), and integrated into the larger social concerns of those organizations.

State

Each State should establish a unified drug agency on the model as that proposed for the Federal government. The agency should be equipped to provide information about programs and drug-use patterns, to assume joint responsibility for evaluating federally funded programs, and to evaluate and direct the State's programs.

Community

Each community with a significant drug-use problem should create a coordinating council to insure communication and concert of actions between the drug-related functions in the community.

Legal Controls

International

A series of technical recommendations includes provisions for effective extradition procedures, exchanges of information between countries, changes in the Single Convention and the Psychotropic Convention, and recognition of the needs and rights of individual nations.

Federal

1. The status of cocaine should be discussed at all national levels, with the American Medical Association conducting a survey to determine if cocaine is essential in medical practice.

2. At present barbiturates should be placed in Schedule II of the Federal Controlled Substances Act, but the AMA should furnish to physicians guidelines on the prescribing of barbiturates and encourage State medical societies and practitioners to respect these guidelines.

3. Methaqualone should be placed in Schedule II along with the amphetamines.

4. The National Institute of Alcohol Abuse and Alcoholism should devote substantial effort to the development of better nonprohibitory means of controlling availability of alcohol. Society should work through availability controls to structure alcohol use, so that social costs of its use may be minimized.

Federal and State

1. The unauthorized possession of

any controlled substance except marihuana for personal use should remain a prohibited act. As a matter of statute or enforcement policy, assertion of control over the consumer should not be tied to accountability but to concepts of assistance appropriate in the individual case. The purpose of enforcement of possession laws should be detection and selection of those persons who would benefit by treatment or prevention services.

2. For those drug-dependent persons who are apprehended for consumption-related offenses, including possession, one of the following dispositions should be mandatory: (a) diversion to a treatment program; (b) diversion to a treatment program after conviction but before entry of judgment by the court.

Failure by an individual to comply with the conditions of treatment would result in his return to the court for prosecution or sentencing. In that event, he should be subject to punishment by up to 1 year imprisonment, a fine of up to $500, or both.

For those nondrug-dependent persons who are apprehended for consumption-related offenses, including possession, one of the following dispositions should be mandatory: (a) diversion to a prevention services program; (b) diversion to a prevention services program after conviction but before entry of judgment by the court; (c) a fine of up to $500; or (d) probation with appropriate conditions.

Failure by the individual to comply with the conditions of prevention services under alternative (a) or (b) would result in his return to the court for prosecution or sentencing. In that event, he should be subject to punishment by up to 1 year's imprisonment, a fine of up to $500, or both.

State

1. All States should attempt to rationalize the operation of the criminal justice system as a process for identifying drug-dependent persons and for securing their entry into a treatment system. The States should establish a separate treatment process which runs parallel to the criminal process and which may be formally or informally substituted for the criminal process.

2. Each State should review its penalty structure for trafficking offenses and determine whether the penalties are commensurate with the relative severity of the offenses. The Commission endorses the criminal provisions in the 1970 Federal Controlled Substances Act and recommends that the States use them as a model.

Law Enforcement

Federal

1. Federal criminal investigative agencies should concentrate on the top of the illegal drug distribution network: importation, exportation, and large volume foreign and domestic trafficking.

2. The Federal effort should concentrate on preventing diversion of drugs at the manufacturing and wholesale levels, leaving to the States responsibility for supervising retail pharmacies and physicians.

3. Federal law enforcement agencies must develop long-range strategies. The degree to which an investigation can penetrate the illegal market depends on how long it remains undercover before surfacing to make arrests and obtain convictions.

4. Criminal investigation activities at the Federal level should not have regional offices, but should deploy strike forces which are able to follow the distribution networks wherever they lead.

5. Federal agencies should give recruitment of drug investigative agents

high priority. Screening of recruits should include testing to insure suitability for this type of enforcement.

6. Federal drug law enforcement personnel should receive more intensive training. Career agents should take refresher courses.

7. Federal agencies should encourage skilled criminal investigators to remain in the field, giving them equal promotional opportunities within the investigative area.

8. A separate unit should be established to maintain internal security among Federal drug law enforcement agencies. This unit should be distinct from all other drug law enforcement activities and report directly to the Attorney General of the United States.

9. All Federal law enforcement agencies, especially the Bureau of Narcotics and Dangerous Drugs and the Bureau of Customs, should use uniform reporting forms so that the information can be combined, studied, and shared.

10. The Federal Government should provide State and local agencies technical and funding assistance necessary for the development of a national reporting system on drug arrests and case dispositions which can provide reliable, valid, and comparable data.

State

1. State enforcement should concentrate on the lower levels of both licit and illicit distribution networks. State criminal investigative agencies should focus on middle-level trafficking. State regulatory agencies should concentrate on inspecting pharmacies, physicians, and researchers. Both regulatory and investigatory State agencies should work on pharmacy drug thefts, developing standards to minimize this serious problem.

2. Every State should review and evaluate the operations of its boards of pharmacy and medicine to ensure that they are enforcing the provisions of State and Federal law. Professionals who knowingly or repeatedly violate State drug regulations and laws should lose their licenses to practice, in addition to being prosecuted. Each State should establish an advisory medical body to act as liaison between the State medical society and law enforcement officials.

3. State and local enforcement agencies should recruit younger men and women into their drug investigation units. Recruits should be carefully screened and receive extensive training. Federal agencies should provide technical and financial training assistance.

4. Each State with a substantial trafficking problem should have a separate unit, responsible to the State attorney general, charged with the responsibility of investigating evidence of corruption in drug law enforcement agencies.

Community

1. Local police departments should participate with other community institutions in the development of a preventive services program. The departments should formulate guidelines for nonarrest dispositions of persons to appropriate prevention or treatment services. Police departments should consider using citations, or other means of directing persons into the appropriate programs.

Those States which have not done so should authorize law enforcement or public health officers to make noncriminal referrals of persons under the influence of controlled substances or possessing controlled substances for personal use.

2. Local police should receive training in dealing with the medical needs of drug-dependent persons, including

alcoholics. Guidelines should be developed for diverting such persons to treatment facilities for emergency care and formal treatment.

3. Local police should act as an early warning system on emerging patterns of drug use in the community, including changes in at-risk populations and nondrug developments which may be relevant to drug-using trends. For example, a constant analysis of drugs on the street can be useful in preparing other community agencies to launch specifically targeted preventive efforts.

Treatment and Rehabilitation

Federal Funding, Services, Evaluation, and Regulation

1. Through block and formula grants to the States, the Federal Government should have responsibility for funding treatment and rehabilitation services administered by the States.

2. Except for offenders within federally operated correctional institutions, the Federal Government should not have operating responsibility for providing treatment and rehabilitation services. Services provided to persons entering treatment on a voluntary basis or through involuntary civil commitment proceedings should be provided only at the State level.

3. The Federal Government should sponsor a program to evaluate existing drug treatment and rehabilitation programs and establish suitable criteria and objectives. The Federal Government should establish performance criteria for State drug treatment and rehabilitation programs.

4. Opiate antagonists, or similar chemical agents, should not be administered involuntarily under any circumstances.

5. The Government should continue to prohibit heroin maintenance as a treatment modality.

State Treatment Programs

1. Each State should establish a comprehensive drug dependence treatment and rehabilitation program including integrated health, education, information, welfare, and treatment services administered as part of a broader health care delivery and human resources development systems. The program should:

(a) Provide a full range of treatment and rehabilitation services, including emergency, residential, intermediate, and outpatient services for drug-dependent persons, persons incapacitated by controlled substances, or persons under the influence of controlled substances.

(b) Include medical, psychological, and social service care; vocational and rehabilitation services; job training and career counseling; corrective and preventive guidance; and any other rehabilitative services designed to aid the person to gain control over or eliminate his dependence.

(c) Emphasize the development of community-based emergency, intermediate, outpatient, and followup support services.

(d) Utilize and coordinate public and private resources, wherever possible utilizing the facilities of and coordinating services with community mental health services and general hospitals.

(e) Allocate services within the State according to an overall plan based on the estimated size and location of the current and potential populations of drug-dependent persons.

2. The administrator of such a comprehensive drug dependence treatment program should have statutory responsibility to:

(a) Establish standards and guidelines for effective treatment services provided by public or private agencies participating in the program.

(b) Evaluate public and private treatment services included in the program to assure that such services are adequate and effective.

(c) Publish annually a list of all public facilities and those private facilities to which public agencies are authorized to refer individuals for treatment services.

(d) Assure that the courts of each jurisdiction within the State are notified of facilities through which services are available within the jurisdiction and of the treatments offered at each facility, thereby assuring that formal control is not asserted over a person for purposes of treatment when appropriate facilities are not available.

(e) Assure that the services offered include drug-free programs as well as maintenance programs, thereby assuring that persons seeking or referred for treatment have the option of participating in a drug-free program.

3. Each State should review its statutory mechanisms regarding the process by which drug-dependent persons are permitted or compelled to enter treatment. Those States which have not done so should modify legislation to encourage drug-dependent persons to seek treatment voluntarily. Formal legal processes should be avoided and absolute confidentiality of the treatment records should be assured.

4. Whenever a State chooses to exert formal control over a drug-dependent person for purposes of treatment, either through criminal process or an involuntary civil process, treatment services should be administered in accordance with the following standards:

(a) Each person has a right to receive such individual treatment as will give him a realistic opportunity to overcome his dependence.

(b) An individual treatment plan, guided by medical and clinical judgment and maximizing freedom of choice of the patient, shall be prepared and maintained on a current basis for each person.

(c) No person should receive chemical treatment or maintenance services without his consent, and in the case of persons under 18 years of age, without additional consent of his parents or legal guardian.

(d) Each individualized treatment plan should employ methods which restrict the drug-dependent person's liberty only when less restrictive alternatives would be inconsistent with treatment.

(e) No person should be required to be a subject for experimental research without his expressed and informed consent.

(f) All persons should be required, as a condition of participation in a treatment program, to comply with reasonable conditions, including surveillance techniques such as urinalysis.

5. The State should assure that private and public hospitals do not discriminate in admission or treatment policy against any person on the grounds of use of or dependence on controlled substances.

6. Every State should have confidentiality-of-treatment laws, modeled after the provision in the draft Uniform Drug Treatment and Rehabilitation Act, currently before the Conference on Commissioners on Uniform State Laws.

7. The Commission supports the adoption of the Uniform Drug Dependence Treatment and Rehabilitation Act being considered by the National Conference of Commissioners on Uniform State Laws.

Prevention

General

1. Drug use prevention strategy should emphasize other means of obtaining what users seek from drugs—means that are better for the user and for society. The aim of prevention policy should be to foster the conditions of fulfillment and instill the necessary skills for coping with the problems of living, particularly the concerns of adolescents. Information about drugs and the disadvantages of their use should be incorporated into general programs, stressing benefits with which drug consumption is largely inconsistent.

2. Drug dependence prevention services should include educational and informational guidance for all segments of the population; job training and career counseling; medical, psychiatric, psychological, and social services; family counseling; and recreational services.

3. Government should not interfere with private efforts to analyze the quality and quantity of drugs anonymously submitted by street users and to publicize the results through media, like rock stations and the underground press.

4. The Government should not support, sponsor, or operate programs which compel persons to undergo chemical surveillance, such as urine analysis, unless the person is participating in treatment services, is a prospective or actual public employee, is charged with a crime, or is a member of the military.

Federal

1. The Federal Government should fund prevention services through block and formula grants to the States and should sponsor basic research in the prevention area. The Government should retain discretionary funds for direct assistance to innovative and experimental programs, as well as to programs in communities receiving insufficient aid from the State.

2. Federal agencies should immediately review the situation of manpower resources in the area of drug treatment and prevention. The review should cover training resources, as well as number and kinds of skilled personnel already available.

State

1. The responsibility for designing a prevention strategy and operating programs should reside at the State and local levels. Each State should establish a comprehensive drug dependence prevention program.

Part II. Private Institutions

Health Professions

1. Schools of medicine, nursing, and public health should include instruction dealing with the social and medical aspects of drug use, so that health professionals know the problems and possibilities of treating drug use and understand the social implications of licit and illicit drug use.

2. The medical profession should prepare criteria for use of all psychoactive drugs in medical practice. These guidelines should stress restraint in use, emphasizing that they are not a treatment of first resort and that when prescribed, they should be given in the smallest doses possible. Medical societies should see that the guidelines are widely distributed and, in simplified form, made available to patients themselves. Professional organizations should continue education courses in the uses and dangers of psychoactive substances.

3. Doctors and pharmacists should warn patients of the risks of depend-

ence, overdose, and use in conjunction with similar drugs such as alcohol.

Pharmaceutical Industry

Manufacturers

1. Manufacturers of psychoactive substances should undertake a campaign to educate health professionals and the public about the role of these drugs in treatment of anxiety, tension, and depression. Information and advertising aimed at physicians should emphasize the need for restraint; point out alternative therapies; and disclose harmful side effects, risks in prolonged use, and dangers in combining use with that of other drugs, including alcohol. In nontechnical language, a series of public service advertisements should carry the same message to the public.

2. Drug companies should not send doctors unsolicited samples of psychoactive drugs.

3. Manufacturers should contribute a significant part of their research capacity to exploring the technical side of the drug-use problem: the nature of drug dependence, the development of less harmful substitutes for those substances most often associated with disruptive use patterns, and the search for chemical correctives to dependent and chronic use of psychoactive substances. The industry should continue to pool its knowledge and resources in the search for narcotic antagonists.

4. Advertising of proprietary mood-altering drugs should omit suggestions that the substance can result in pleasurable mood alteration or deal with malaise caused by stress or anxiety. Proprietary drug producers should develop standards which reflect correct use of home medications and establish a procedure for insuring industrywide compliance. At a minimum, the procedure should contain: an independent mechanism to review any advertisement for compliance; opportunity for the public to submit an advertisement for review; and sanctions to be imposed on advertisers who do not abide by decisions of the review board.

Retail Pharmacies

1. All pharmacists must verify the identity of persons seeking prescription psychoactive drugs. They must also enforce the regulations which apply to over-the-counter cough preparations containing codeine.

2. Steps should be taken to reinvolve the pharmacist in the consumption decision, particularly with respect to psychoactive substances.

Alcohol Industry

1. The alcohol beverage industry should fund research into the nature of disruptive alcohol-using behavior and the relation between alcohol use and traffic accidents, violent crimes, and domestic difficulties.

2. Manufacturers and distributors should educate the public to the fact that irresponsible use of alcohol is the most widespread and destructive drug-use pattern in this nation. Advertising should emphasize moderate, responsible use and point out dangers of excessive consumption.

3. The industry should reorient its advertising to avoid making alcohol use attractive to populations especially susceptible to irresponsible use, particularly young people.

Legal Profession

1. Bar associations should conduct courses on criminal drug cases. Law schools should develop courses dealing with drug use and behavior as part of the wider sociolegal problems confronting the legal profession.

2. Lawyers must point out to the public the need for alternatives to the

legal response and the urgency of involving other social institutions in the effort to control drug-using behavior. By the same token, the bar has an important obligation to discourage violations of the law.

Industry

1. Management and unions, supported by the Departments of Labor and Commerce, should cooperatively undertake a study of employee drug use and related behavior.

2. The business community should not reject an applicant solely on the basis of prior drug use or dependence, unless the nature of the business compels doing so. When preemployment screening is necessary, companies should establish appropriate procedures for job applicants and keep the results confidential.

3. Industry should consider alternatives to termination of employment for employees involved with drugs. Where the nature of the business allows, employees should be referred to company-run or other rehabilitation or counseling programs.

4. The business community should consider adopting programs patterned after the "troubled employee" or "employee assistance" concept.

5. The fact of treatment and rehabilitation should be confidential. No record of the employee's drug problem should be in any file open to routine inspection. If treatment requires a temporary absence, the company should attempt to keep the employee's job open for him.

6. Insurance benefits should include drug care insurance, similar to that included in most major medical plans for treatment of mental illness.

7. Insurance companies offering health, liability, and life insurance must confront the issue of underwriting drug users and drug-dependent persons. Companies should not refuse insurance policies solely on the basis of prior or present drug use or enrollment in a drug rehabilitation program.

Colleges and Universities

1. Colleges and universities should make their policies and practices regarding drug use, including alcohol, explicit, unambiguous, and available to all students.

2. Even those colleges and universities which disapprove of drug-use behavior should expand their counseling services rather than rely upon disciplinary measures alone.

3. Counseling, treatment, and rehabilitation programs on campus should ensure confidentiality. Specific rules should be set up indicating to whom confidentiality will be extended and under what circumstances.

Mass Media

1. Since governmental intervention is inappropriate here, the media must reexamine the impact of informational messages on youthful interest in psychoactive drugs. They should look not only at advertising but also at anti-drug public service announcements, at program content, and at news coverage of "drug stories."

2. In conjunction with their self-appraisal, the media should sponsor and support long-term research into effects of communications on behavior.

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Long-Term Interactions of Marijuana and Behaviour in Chimpanzees

D. M. Grilly, D. P. Ferraro, and R. G. Marriott

Marihuana produces differential effects in human naive and experienced marihuana smokers, but owing to ethical constraints involved in repeatedly administering marihuana to drug-naive humans, many human experiments have involved experienced marihuana users as subjects. These constraints are minimal with nonhuman subjects, and the great majority of animals used in marihuana research have been drug naive. So far, distinguishing between the long-term effects of marihuana in drug-naive and drug-experienced animal subjects has little precedence. We report here observations, made over a 2-year period during our marihuana research with chimpanzees, which indicate that experiential factors may play a major role in the effects of marihuana on complex behavior.

Most of our studies have been performed with a delayed matching to sample task. The experimental paradigm involves presenting one of six sample stimuli on a key mounted on a stimulus-response panel fixed to the chimpanzee's cage. The chimpanzee must press this sample key 10 times when the sample stimulus goes out and a delay period is initiated. Then a different stimulus is presented on each of three choice keys mounted below the sample key, one of which is the same as that previously presented on the sample key. If the chimpanzee chooses this stimulus, a 1-gram banana-flavored pellet is delivered into a foodwell located below the keys and the trial ends. If the chimpanzee chooses either of the two incorrect stimuli, the trial is terminated and another begun. The stimuli are three forms (x, —, Δ) and three colors (red, blue, and green); within a trial all are from the same stimulus dimension. Generally, each chimpanzee completes 100 trials per day. The five adult chimpanzees had previously been administered several doses of a marihuana compound while performing under simple operant schedules of reinforcement.

Our previous data indicated that the delayed matching-to-sample performance of chimpanzees was disrupted by single marihuana administrations. Our first delayed matching-to-sample observations were made during a 4-month period while running the chimpanzees on various delay values of the matching task, and assessing the effects of 1.0 mg/kg^{-1} Δ^9-*trans*-tetrahydrocannabinol (Δ^9-THC) on performance at each delay. Subsequently, the chimpanzees were maintained for an additional year on the delayed matching-to-sample task, during which time they experienced over 80 additional drug doses ranging from 1.0 to 4.0 mg/kg^{-1} Δ^9-THC. Although the behavior in the first phase of our observations was asymptotically stable during the time period studied, by the end of the subsequent year the nondrug performance had improved considerably.

To determine whether the original relationship between the disruptive effects of Δ^9-THC and the length of the matching-to-sample delay interval had been maintained across the extensive exposure to the behavioral task and drug, the initial delayed matching-to-sample experiment was replicated with the same chimpanzees. In this phase only delays of 5, 20, and 40 seconds were used. The procedure for

both phases involved running the chimpanzees at each delay for several days until the behavior had stabilized, after which 1.0 mg/kg^{-1} Δ^9 THC was administered orally.

A comparison of the nondrug control data for the two phases indicates that the accuracy of matching responses had improved during the chimpanzee's year-long exposure to the delayed matching task. In both phases, matching accuracy decreased as the length of the delay interval was increased. This inverse relationship was significant for both phase 1 and phase 2; however, the delay values at which Δ^9-THC produced a significant impairment in matching accuracy had changed between phases 1 and 2.

For the first phase of observations only the drug effects obtained at the 5- and 20-second delays were significant relative to nondrug control. The effects of Δ^9-THC would seem to be specific to that aspect of the delayed matching task which involves short-term memory. Lack of a drug effect at the 40-second delay may have been due to the fact that nondrug matching accuracy at this delay approached chance performance for some chimpanzees. In contrast, in phase 2 little or no drug effect was observed at 5- and 20-second delays, and only the drug effect obtained at the 40-second delay was statistically significant.

Drug effects obtained during phase 1 at 5- and 20-second delays were not replicated during phase 2 which suggests that tolerance developed to the effects of Δ^9-THC on matching performance at these delays. Whether this tolerance was due to the additional behavioral training received by the chimpanzees during the intervening year or to the fact that they had become more experienced with Δ^9-THC, or both, cannot be determined from this experiment. One interpretation is that higher levels of matching accuracy are not as readily impaired by Δ^9-THC as are lower performance levels, and data obtained at the 0-second delay in phase 1 and at the 5- and 20-second delays in phase 2 are consistent with this. That is, matching behavior at these delays may have been so well learned that it was not susceptible to the disruptive effects of the drug; however, nondrug matching accuracy at the 5-second delay in phase 1 was somewhat higher than it was for the 20-second delay in phase 2, and a significant drug effect was obtained for only the former condition. On the other hand, in a test run between phases 1 and 2 there was no indication of tolerance development to Δ^9-THC when chimpanzees were dosed for 21 or 42 consecutive daily sessions under the same 20-second delayed matching-to-sample task.

Observations suggested that the intermixing of drug and nondrug experiences, as well as the number of drug experiences, may be important to the development of Δ^9-THC tolerance. Subsequent to phase 2, animals were maintained at a 40-second delay value and were again administered 1.0 mg/kg^{-1} Δ^9-THC on two occasions separated by several nondrug days. The last of these drug administrations produced a minimal decrease in the percentage of correct matching responses from 80.1 percent (nondrug control) to 77.5 percent (drug), thus again demonstrating tolerance to Δ^9-THC, at the long matching-to-sample delay of 40 seconds. As this tolerance had developed quite rapidly, we attempted to determine whether the drug was still behaviorally inactive by increasing the length of the delay interval still further to 63 seconds. The chimpanzee's nondrug performance at this delay quickly stabilized at approximately 80 percent correct matching;

under a 1.0 mg/kg^{-1} dose of Δ^9-THC, matching accuracy was significantly decreased to 72.7 percent.

A definite pattern of long-term marihuana-behavior interactions had been established; reliable Δ^9-THC effect was first produced at a short matching-to-sample delay value; continued intermixing of nondrug and drug sessions at that delay value was accompanied by a reduction in the drug effect. By increasing the length of the delay, a reliable drug effect was again obtained but diminished after the chimpanzees had experienced a number of nondrug to drug transitions at that delay, and so on. It is difficult to offer a pharmacological explanation for our observations that tolerance developed to Δ^9-THC effects at a particular delay value but did not persist when the length of the delay was increased. Indeed, it seems more appropriate to suggest that the observed tolerance was the result of the chimpanzee's learning to perform behavior which compensated for the drug effects produced in a particular delay situation. Repeated exposures to a defined delayed matching-to-sample task under mixed nondrug and drug conditions may provide the chimpanzee with sufficient opportunities to acquire responses which counteract the detrimental behavioral effects produced by Δ^9-THC in that specific delay situation.

Although the nature of these learned compensatory responses cannot be specified, a comparable adjustment process may occur in human marihuana smokers. In general, the performance of experienced human marihuana users on behavioral tasks is not as susceptible to the disruptive effects of marihuana as is that of drug-naive humans even though the subjective effects of marihuana may become more intense with repeated drug experiences. Nevertheless, there are implications of the present hypothesis which need direct empirical verification. It would seem that once compensatory responses had been learned in a specific stimulus situation, tolerance to drug-produced behavioral effects in that situation should be relatively permanent. That is, at least a partial tolerance should be retained even after a long-term abstinence from both the drug and the stimulus situation had been enforced, but no data for Δ^9-THC are available, even of an indirect nature, which support this implication.

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Excretion of *trans*-Δ^9-Tetrahydrocannabinol and Its Metabolites in Intact and Bile Duct-Cannulated Rats

Robert F. Turk, William L. Dewey, and Louis S. Harris

In the earliest reports on the distribution of Δ^9-tetrahydrocannabinol, investigators described the distribution of ^{14}C-Δ^9-tetrahydrocannabinol, isolated from marihuana grown in a $^{14}CO_2$ atmosphere, in the rat. Later findings using a fluorometric method and using TLC were consistent with the earlier reports. Human studies indicated that only 5.2 percent of smoked radiolabeled hashish was secreted by the bile and 16.9 percent was excreted through the urine.

Owing to the recent synthesis of highly purified tritium- and carbon-labeled Δ^9-tetrahydrocannabinol and their availability to the research community, progress has been made concerning its metabolism and excretion. We have examined the excretion kinetics of intravenously and orally administered tritium-labeled Δ^9-tetrahydrocannabinol and its metabolites in the feces, urine, and bile of bile duct-cannulated rats and in urine and feces of noncannulated rats.

Tritium-labeled Δ^9-tetrahydrocannabinol (25.4 μc./mg.), labeled in positions 2, 4, 8, and 10, with radiopurity of 100 percent and GLC purity of 97 percent was obtained fom the National Institute of Mental Health. Male Sprague-Dawley rats, weighing between 230 and 260 grams, were used.

Excretion of tritium-labeled Δ^9-tetrahydrocannabinol administered intravaneously—Tritium-labeled Δ^9-tetrahydrocannabinol (4 mg./kg., 5 μc./rat) was administered intravaneously to each rat in a total albumin suspension volume of 0.2 ml. Two groups, consisting of four rats each, were used; one group was bile duct cannulated and the other was not. All rats were housed individually in metabolism cages with water and food available ad libitum.

The bile duct cannulation was performed 4 days prior to the injection. Bile and urine were collected separately at 3, 6, 12, 48, 72, and 96 hours after administration of drug. Feces were collected at 12, 24, 48, 72, and 96 hours after administration.

Excretion of tritum-labeled Δ^9-tetrahydrocannabinol administered orally—Two groups of rats (one bile duct cannulated, the other not), consisting of five rats each, were used. The only variation from the intravenous study was that these rats were administered 100 mg./kg. of Δ^9-tetrahydrocannabinol (10 μc.) orally in a total albumin suspension volume of 2 ml.

Intravenous Route of Administration

Bile duct-cannulated rats—In the bile duct-cannulated rats, 66.9 percent of the radioactivity was excreted during the first 96 hours. Of this amount, 4.8 percent was excreted in the urine, 59.4 percent in the bile, and 2.7 percent in the feces. The major portion of the radioactivity that was excreted in the bile was excreted in the first 3 hours; after 12 hours, excretion by the biliary route dramatically decreased.

Excretion of radioactivity in the urine was essentially complete within 48 hours. The excretion of radioactivity in the feces was detectable only during the first 24 hours.

Noncannulated rats—In the noncannulated rats, 55.8 percent of the radioactivity was excreted during the first 96 hours. Of this radioactivity, 7.4 percent was excreted in the urine

and 48.4 percent was excreted in the feces.

Excretion of radioactivity in the urine was greatest in the first 12 hours and negligible for the remainder of the 96-hour period. Of the radioactivity excreted in the feces, the greatest excretion occurred between the 12- and 48-hour interval and appeared to be complete by 72 hours.

Oral Route of Administration

Bile duct-cannulated rats—The bile duct-cannulated group of rats excreted 65.5 percent of the radioactivity in 96 hours. Of this radioactivity, only 2.7 percent was excreted in the urine, 41.5 percent was excreted in the feces, and 21.5 percent was excreted in the bile.

Noncannulated rats—The noncannulated rats excreted 63.6 percent of the total radioactivity in the 96-hour period. Of this amount, 6.9 percent was excreted in urine and 56.7 percent was excreted in the feces.

The results show that 55–67 percent of the radioactivity is excreted within 96 hours after either an oral or intravenous injection of tritium-labeled Δ^9-tetrahydrocannabinol. The data also show that the major route of excretion of Δ^9-tetrahydrocannabinol is by way of the bile, mainly as polar metabolites.

Analytical data indicate that when the bile duct was not cannulated, the radioactivity excreted in the feces following oral dosing represented mainly metabolites. However. when the bile duct was cannulated, these metabolites were found in the bile but not in the feces. Determination of radioactivity following intravenous administration showed that there was negligible excretion of radioactivity in the feces of bile duct-cannulated animals. However, ^3H excreted in the noncannulated rats was associated with metabolites 8,11-dihydroxy-Δ^9-tetrahydrocannabinol and 11-hydroxy-Δ^9-tetrahydrocannabinol. On this basis, one might theorize that the long duration of action of Δ^9-tetrahydrocannabinol might be due to enterohepatic circulation of either one or more of its metabolites.

A considerable quantity of the radioactivity excreted in the feces of rats given tritium-labeled Δ^9-tetrahydrocannabinol orally was identified as the parent compound. This material probably represents Δ^9-tetrahydrocannabinol which was not absorbed from the GI tract.

Radioactivity in the urine was in the form of metabolites of Δ^9-tetrahydrocannabinol. These data agree with previous reports of the appearance of polar metabolites in the urine. Zone scraping of the TLC plates indicates the presence of metabolites other than 11-hydroxy-Δ^9-tetrahydrocannabinol and 8,11-dihydroxy-Δ^9-tetrahydrocannabinol. Identity of this large polar fraction has not been achieved. The identity of the material remaining in the feces after exhaustive extraction is also a mystery. Unfortunately, sufficient samples of material were not available for hydrolysis studies. These are planned.

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Single-Dose Effect of Marihuana Smoke: Bronchial Dynamics and Respiratory-Center Sensitivity in Normal Subjects

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The inhalation of marihuana smoke is the most common method used to obtain its euphoric sensation. The major advantage of smoking, rather than ingestion, is that inhalation offers both very rapid absorption and some control over dosage. Yet, despite its widespread use, its effect on respiration is not documented. Therefore, we began to study the influence of marihuana on respiration in health and disease. This report concerns the acute effect of marihuana smoke on the normal tracheobronchial tree and on respiratory control.

Subjects were student volunteers whose ages ranged from 18 to 26 years. They were screened by a psychiatric interview, medical-history questionnaire, physical examination, chest roentgenogram, and comprehensive pulmonary-function tests. All subjects had to meet the criteria of clinical normality, and prior experience of marihuana smoking was required.

Screening Pulmonary-Function Studies

These tests included conventional steady-state spirometry with determination of minute ventilation, oxygen uptake, and lung volume compartments including functional residual capacity by helium rebreathing. Dynamic tests consisted of analysis of the forced vital capacity (FVC) for volume and percent exhaled in the first second (FEV), the maximal mid-expiratory flow (MMEF), and peak expiratory flow rate; the carbon monoxide diffusing capacity ($D_{LCO}SB$) was determined by the single-breath method. All these measurements were made on a 13-liter spirometer system; spirographic and gas analyses were performed by small on-line computers. The best of three efforts was selected and compared to normal predicted values.

Airway resistance (R_{AW}) and thoracic gas volume (TGV) were measured in a constant-volume body plethysmograph. Airway conductance, the reciprocal of R_{AW}, was expressed per liter of TGV, as specific conductance (SG_{AW}). Tests were performed in triplicate before smoke administration and at 2 to 4, 6 to 8, and 20 minutes after smoking.

Flow-volume loops permitted a second method of analysis of the airway mechanics. Volume, measured in a 10-liter waterless piston spirometer, was plotted against flow on an X-Y recorder. After several tidal-volume loops, the subject exhaled to residual volume and inspired to one-half of his previously measured FVC, indicated on a meter. He then exhaled rapidly and completely. The flow rate was measured at one-half of this volume —that is, at 25 percent of vital capacity. Loops were recorded in triplicate before smoking and at 4 to 6, 8 to 10, and 20 minutes after smoking.

Respiratory-center sensitivity was measured by a closed-circuit rebreathing method. A 9-liter water spirometer initially contained 95 percent oxygen and 5 percent carbon dioxide; every effort was made to continue rebreathing until the inspired carbon dioxide reached 9 percent. A small computer continuously recorded the instantaneous respiratory rate, tidal volume, minute ventilation (V_E) and end-tidal carbon dioxide tension from

a nondispersion infrared spectrophotometer. Subsequently, the slope of the line, expressed in liters per torr of carbon dioxide, was calculated, as well as the minute ventilation at 9 percent end-tidal carbon dioxide (64 torr). Studies were performed twice before and once after smoking.

The heart rate was recorded continuously throughout these experiments.

Drug Administration

To allow control over the amount of smoke available for absorption, we used a box-balloon system. The smoke from the combustion of a carefully weighed amount of marihuana was drawn into the rubber bag, itself in a box connected to a spirometer so that the volume of gas in the bag could be measured. This modification permitted a more homogeneous dilution and cooling of the smoke and prevented its contact with the water surface of the spirometer.

The marihuana supplied by the National Institute of Mental Health was *Cannabis sativa*. One batch had a concentration of 2.6 percent Δ^9-tetrahydrocannabinol (Δ^9-THC), and the other 1.0 percent. The subjects were assigned at random to the high or the low concentration. Each then received the total smoke from the burning of 3.23 milligrams of marihuana per kilogram of body weight. This allowed the delivery of identical volumes of smoke with different amounts of Δ^9-THC.

One investigator prepared the dose and monitored the electrocardiogram. The subjects as well as the other investigators were told that the test might involve marihuana of good or of poor quality or a placebo. It was acknowledged that the subjects would recognize which material they had received, and they were asked to refrain from commenting until all measurements were completed. The fact that no placebo was used was not revealed to the subjects nor to the other investigators until the entire study had been completed.

There were eight male subjects and one female in the high-dose group and seven male and one female for the low-dose group. Both groups had identical mean ages, 21.8 years, and similar stature. There was one slight cigarette smoker in each group; the others were nonsmokers. Marihuana use ranged from heavy or 15 "high" per week-years to light or two "high" per week-years, with a similar distribution in both groups.

Results

Screening lung-function studies—Results were within the normal range for each subject. There were no significant differences between group means except that the low-dose group had a slightly larger mean percent predicted residual volume. All chest roentgenograms were normal.

Subjective response—The subjects who were given the high concentration readily recognized that they had received "good dope." Those given the low concentration were equally certain that they had received "practically nothing" or "very little" marihuana.

Heart rate—The familiar rise was apparent in the high concentration group. The baseline of 82 $\pm$ 6 (mean $\pm$ S.D.) rose to 105 $\pm$ 18 at 15 minutes. A two-way analysis of variance for repeated measures showed: that the effect of the two drug levels were different; that the drug effect changed over time; and that this change over time was different in the "high" group as compared to the "low" group. This change over time was curvilinear and significantly different from that of the "low" group.

Airway resistance—In every subject of each group R_{AW} decreased.

Specific airway conductance—Since all measurements were made at the same mean lung volume, the changes in SG_{AW} mirrored the resistance changes; SG_{AW} rose over time for all subjects. The difference between the two drug-concentration groups did not quite reach significance.

Flow-volume curves—The bronchodilator effect was also observed in the flow-volume curves. The mean expiratory flow rate at 25 percent of vital capacity increased from 1.79 ± 0.24 to 2.59 ± 0.43 liters per second for the "high," and from 1.88 ± to 0.49 to 2.20 ± 0.69 liters per second for the "low" group. Analysis of variance showed an increase in the flow rate over the successive measurements for all subjects, and the trend of this increase was different for the two treated groups.

Correlation between bronchodilation and tachycardia—There was no correlation between the actual heart rates and SG_{AW} values at baseline, but the correlations became significant after drug administration. The heart-rate change at 5 minutes after the drug was the best predictor of the airway change at 20 minutes after smoking. This observation indicates that the drug effects in the two organ systems are highly correlated but with different time characteristics.

Carbon dioxide sensitivity curves—Measurements made twice before drug administration showed wide variation between individual responses. In some subjects the two trials matched well, whereas in others the ventilatory response was decreased the second time, but there was no statistical difference between the two trials. After marihuana smoking, there was no significant change with either concentration when the response of the respiratory center was expressed in terms of the slope of the curve. Similarly, there was no change of ventilation at 9 percent carbon dioxide.

The advantage of the mode of administration that we selected is that it permitted control over the amount of smoke offered for absorption: Two different concentrations of Δ^9-THC were presented in identical amounts of "vehicle." This method is sufficiently unique to caution against generalization. It is possible that the temporary storage in the rubber bag, the dilution, and the cooling of the smoke caused some loss of Δ^9-THC as well as potentially irritating substances.

Body plethysmograph data indicate that marihuana smoke has a striking bronchodilator effect. The flow-volume curves support this observation. The mean decrease of 38 percent in R_{AW} compared very well with the mean increase of 45 percent in flow rate at one-quarter of vital capacity. The effect was dose related. When the heart rate was taken as an index of Δ^9-THC physiologic activity, a dose-response relation was strongly supported.

These findings are congruent with those of investigators who suggest that cannabis may be a beta-adrenergic agent. Our observations of lack of an effect of marihuana on the respiratory center at the doses used sharply contrasts with the marked depressive effects of the opiates and related compounds.

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Some Correlates of Marihuana Self-Administration in Man: A Study of Titration of Intake as a Function of Drug Potency

Howard Cappell, Eva Kuchar, and C. D. Webster

Nowhere has the importance of nonpharmacological variables been emphasized more than in human research with marihuana. It even has been suggested that much of the existing behavioral research on the effects of marihuana in man may be "irrelevant," though scientifically and pharmacologically sound, because the importance of sociopsychological variables has not been adequately recognized.

There is evidence to suggest that nonpharmacological variables may exert control over the subjective response to marihuana in "socially relevant" (i.e., low) doses. The present research was designed to explore this issue further in the context of an ad lib self-administration experiment. Subjects were asked to consume marihuana cigarettes varying in THC content until a predefined subjective endpoint was reached. The basic experimental issue was whether experienced marihuana users would titrate their marihuana intake according to THC concentration in achieving a defined subjective state. Accurate titration would be evidence of the ability to respond to the pharmacological variable of potency.

A second experimental issue involved the measurement of the extent to which subjectively regulated doses of marihuana would be associated with measurable behavioral and physiological consequences. Thus subjects were exposed to a battery of tests following the self-administration of marihuana.

The subjects were 12 males age 21–28 years. Each claimed to be an experienced user of marihuana, with current use averaging twice weekly. They agreed to refrain from using alcohol or marihuana for at least 24 hours, and from tobacco for at least 1 hour prior to an experimental appointment. They also agreed to refrain from other psychoactive drugs for the duration of the investigation. Each subject was screened medically and psychiatrically prior to permitting his participation.

The experiment consisted of five sessions spaced at weekly intervals. Each session involved exposure to a battery of tests, a smoking period, and a repetition of the battery. In Session 1 no drug was given, but a 10-minute delay period was interpolated between the first and second administration of the test batteries. Session 2 was a "standardization" session during which all subjects were exposed to material of the same potency (0.4 percent Δ^9-tetrahydrocannabinol). This provided a reference point against which subjects were subsequently to titrate drug intake. On Sessions 3, 4, and 5, the subjects smoked material containing 0.2 percent, 0.4 percent, or 0.8 percent Δ^9-tetrahydrocannabinol (THC). Behavioral and physiological data were collected in the same manner during each session. Prior to Session 1, it was explained that the purpose of the experiment was to study some physiological and psychological aspects of marihuana smoking.

Typical Experimental Session

Except for minor variations, sessions were conducted according to a fixed schedule. Upon arrival, the subject was conducted to a spacious, well-lit

room in a laboratory suite. On all but Session 1, a breathalyzer test was given to assure that blood alcohol level was zero. A nurse then recorded blood pressure and pulse, and rated conjunctival injection. Next a 1-minute sample of pulse rate was obtained using a finger pulse transducer in conjunction with a polygraph.

Prior to smoking each subject performed on three behavioral tasks, always in the same order: pursuit rotor (15 minutes); recognition and recall of verbal material (25 minutes); reaction time (15 minutes).

Prior to all smoking sessions, subjects were told that they were to self-administer marihuana until they had attained a subjectively determined "optimal" high. It was explained in the standardization session and repeated in later sessions that they were to use the level of intoxication reached during Session 2 as a reference point for the remaining sessions. Subjects were required to remain seated while smoking. Cigarettes were made available one at a time upon demand. It was stressed that subjects were to smoke at their own rate and were not to consume any more than necessary to achieve the task, even if this meant discarding most of a cigarette. Separate ash trays were provided for combusted and uncombusted residue. Finger pulse rate was continuously recorded. A record of smoking behavior was obtained by an observer who depressed a key at the onset of an inhalation and released it at the onset of an exhalation. Videotape records were obtained to verify observations in the event of recording difficulties. The subject was alone while he smoked and was knowingly observed from an adjacent room via a one-way vision screen. When the prescribed level of intoxication was reached, the subject summoned an experimenter who collected the uncombusted residue. A nurse then entered to record pulse rate, blood pressure, and conjunctival injection. Finally the subject rated the potency of the material on a scale from zero (not at all potent) to 100 (extremely potent).

Immediately following the post-smoking measurements the behavioral test battery was repeated.

Cigarettes were prepared from cannabis assayed to contain 1.5 percent Δ^9-THC. This was diluted to produce 1 gram cigarettes containing 2, 4, or 8 mg. each of THC. The dilutant was marihuana from which the cannabinoids had been exhaustively extracted.

Marihuana Smoking Patterns

The data summarizing the various indices of marihuana consumption behavior are based on analysis of variance of the results from Sessions 3, 4, and 5. The data on inhalation patterns were obtained from the polygraph records and, where appropriate, were converted from distance to time.

Ingestion patterns—As one estimate of the total amount of drug which was self-administered, the time between inhalation and exhalation onset (puff duration) was summed for each subject at each drug potency. Consistent with a titration process, this estimate of the time during which smoke was in the lungs was inversely related to potency, but the effect was not significant. The total number of puffs was also inversely related to drug potency, but the effect was statistically marginal. The mean duration of a puff was not reliably related to potency nor was the mean duration of the interval between puffs.

Marihuana residue—The weight of marihuana consumed was estimated by weighing noncombusted cigarette residues on a scale sensitive to varia-

tions as low as 0.01 grams. This quantity was subtracted from the weight of material provided to the subjects during a smoking session. This index was significantly and inversely related to drug potency.

Potency ratings—Potency ratings increased significantly as a function of THC concentration.

Behavioral and Physiological Effects

There was a decrease in accurate pursuit rotor tracking and an increase in reaction time. Recognition and recall of verbal material were both impaired. Pulse rate, conjunctival injection, and diastolic blood pressure were significantly increased. In the case of reaction time, pulse rate, and diastolic blood pressure, the effects increased significantly as a function of drug concentration.

The question of major interest is: To what extent did titration of marihuana intake occur? Though somewhat consistent with such a process, the quantitative indices offered far from compelling evidence that the subjects were capable of effective titration. The total time during which smoke was judged to be in the lungs was not significantly related to the potency of the material. The measure of weight of marihuana consumed did significantly confirm the operation of a titration process, but it must be concluded that this support was weak. Even though the potency of the weakest and the strongest material varied by a factor of four, the mean consumption of the least potent marihuana was only 36 percent in excess of that of the most potent. Given the reasonable assumption that the proportion of THC delivered to the subject was independent of potency, the weight index indicated that the effective dose delivered by the high potency material was approximately three times that of the low potency marihuana. That the effective dose was higher the higher the concentration was independently confirmed in the behavioral and physiological data. With reasonable consistency, the observed effects were an increasing function of drug concentration; unless potency per se can explain these relationships, they must reflect dose-response functions.

In summary, it seems reasonable to conclude that titration of marihuana intake according to its potency did not occur to a great degree. The fact that subjects did not titrate reliably is consistent with the suggestion that psychosocial variables may play the most crucial role in the recreational use of marihuana. Clearly, however, the support for such a conclusion is indirect. No single-total dose appeared to be more "socially relevant" than any other in achieving the defined subjective endpoint. Moreover, the total doses which were subjectively relevant to our subjects had clear objective consequences for their behavior.

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A Social Psychology of Marijuana Use: Longitudinal Studies of High School and College Youth

Richard Jessor, Shirley L. Jessor, and John Finney

The prevalence of marihuana use among youth, in spite of the fact that it is illegal and carries the possibility of harsh legal sanctions, constitutes a phenomenon of substantial social-psychological interest. Conceptualizing marihuana use as problem behavior is useful in several respects: Treating it as a specific instance of a more general class of behaviors establishes a logical basis for its covariation with other problem behaviors. Such a conceptualization suggests the kinds of explanatory variables that should be brought to bear—namely, personal and social variables that can account for the occurrence of behaviors likely to elicit negative sanctions from established agents of social control. Also, problem behavior theory can be applied to the issue of differential age of beginning problem behaviors.

Problem behavior such as marihuana use is considered to be purposive, goal oriented, or functional. Functions of problem behavior which may be important enough to the actor to counter the likelihood of negative sanctions include the following: an instrumental effort to achieve otherwise unavailable goals; a learned way of coping with personal frustrations and anticipated failure; an expression of opposition to or rejection of conventional society; a negotiation for or claim upon status transformation; and a demonstration of solidarity with peers or a subculture. No single personality or situational variable is likely to provide a sufficient explanation of marihuana use; what seems to be required is a network of both person and situation attributes logically connected with the behavior involved.

The general network we have employed includes a personality system, a perceived environment system, and a behavior system. The personality system is composed of three related structures—motivational instigation, belief, and personal control—and each structure consists of variables linked to the problem behavior. The perceived environment system is composed of a distal and a proximal structure, the former referring to variables in the environment which are indirectly implicative of the behavior of concern (e.g., value compatibility between parents and peers), and the latter being composed of environmental variables linked directly to the behavior (e.g., perceived social support for marihuana use). The behavior system includes the behavior under consideration and the functions or meanings associated with it, other kinds of problem behavior, and behaviors which are nonproblem, that is, which are conventional or conforming.

Consideration of specific variables led us to theorize that the social psychology of the student marihuana user that emerges from this network includes: greater instigation to use—stemming from higher value on independence, lower value on achievement, and lower expectations for achievement; lesser belief controls against use—greater social criticism and alienation; lesser personal controls against use—greater tolerance of transgression and lesser religiosity; greater environmental support for use—greater peer orientation and greater models and supports; and greater experience with other behaviors of a problem or problem-prone nature.

From this perspective, marihuana use, like other learned behaviors, is a functional outcome of the interaction of personality, social, and behavioral attributes.

Four general hypotheses were examined in our marihuana use data: First, marihuana use should covary with other kinds of problem behaviors. Second, variation in marihuana use should be systematically related to variation in the personality and perceived environment variables. Third, the onset of marihuana use among nonusers should be predictable, over a time interval, from initial differences on personality and social variables measured at the beginning of the interval. And fourth, those who begin marihuana use during the time interval should manifest greater change in the theoretically expected direction than those who remain nonusers.

Subjects—The subjects were junior and senior high school students and college students. The entire junior and senior high school sample was asked to participate in a 4-year study of personality and social development in youth. Parents of each sutdent sampled were asked for signed permission for their child's participation in the research. An initial Year 1 cohort of 949 students agreed to participate, and the Year 1 data were collected in April 1969. Eighty-one percent (N=692) of the initial cohort were retained in Year 2 (April 1970); eighty-two percent (N=605) were subsequently retained in Year 3 (April 1971). Cross-sectional data were drawn from the Year 2 testing, while the data for the analyses of change involved both the Year 2 and the Year 3 testing.

The college study was begun a year after the initiation of the high school study. Two hundred and seventy-six freshmen agreed to participate, and the Year 1 data in the college study were collected in April 1970. Two hundred and forty-eight (90 percent) were retained in Year 2 (April 1971). Cross-sectional data were drawn from the same year used for the high school cross-sectional data, and the college change analyses involved both the Year 1 and Year 2 data.

Procedure—Data were collected by means of a questionnaire requiring about 1½-2 hours to complete. The questionnaire consisted largely of scales or indexes assessing the personality, social, and behavioral variables, plus other concepts.

Questionnaires were administered in small group sessions outside of class hours, and a guarantee of confidentiality was given. Interest in the research was uniformly high, and the quality of the data was generally excellent.

Establishment of the drug user groups—A section of the questionnaire dealt with drug-use experience. Included in this section were four questions designed as a scale of increasing involvement with marihuana and referred to as the Marihuana Behavior Report (MBR) scale. Scores on the MBR scale ranged from 0 to 8, with lower scores indicating nonuse or experimentation without commitment to regular use, and higher scores referring to marihuana involvement based on safeguarding an available supply and engaging in regular use. Scores on the MBR scale were used to establish contrasting marihuana involvement groups. In the junior high sample (Grades 8 and 9), there were two groups within each sex: those with no involvement and those with any involvement. In the senior high sample (Grades 10, 11, and 12), three groups were established within each sex: those with no involvement (MBR score = 0), those with minimal in-

volvement (MBR score = 2), and those with heavier involvement (MBR scale score = 4–8). In the college sample, the MBR scale was also used to establish three groups within each sex (MBR scores = 0-2, 4-6, and 8).

The groups established on the basis of MBR scores were the groups employed in the analyses of the cross-sectional data used to test our first two hypotheses.

For testing the hypotheses dealing with the shift from nonuse to use of marihuana over a year's interval, the approach was to locate subjects who had never used marihuana in the initial year and who had either remained nonusers or had begun using marihuana by the subsequent year's testing. Among the combined junior and senior high school males, there were 158 nonusers who remained nonusers a year later, and 26 nonusers who had become "more-than-once" users by the subsequent year; for the combined high school females, the comparable figures were 215 and 37. For college males, the nonusers who remained nonusers totaled 36, while the number who shifted from nonuser to more-than-once-user status was 14; the comparable figures for the college females were 38 and 12. These groups were employed to examine whether the measures of the social-psychological variables taken in the initial year were predictive of the shift from nonuser to user status by the subsequent year.

Marihuana use—For purposes of providing context, it is useful at this point to describe the reported marihuana use in the high school and college samples. For reported use of marihuana more than once, the rates were quite comparable for both sexes at each school level. They increased substantially as school level (or age) increased, and they showed a marked increase in rates of marihuana use over the 1970 to 1971 interval.

Part I: Cross-Sectional Analyses

The findings provide support for the hypothesized relationships between the variables in the social-psychological network and marihuana use. Looking first at the personality system, users value achievement less and independence more than nonusers and also show a greater discrepancy between the two values, in the direction of independence, than do nonusers. They also have lower expectations for achievement, but this is significant only for females. With respect to the belief structure, users tend toward greater alientation and social criticism although only one of the differences reaches significance at the junior high level. In regard to personal controls, the users are substantially more tolerant of deviance and show relatively less religiosity. Turning to the perceived environment, we find that both distal and proximal variables are significantly discriminating, with users perceiving less compatibility between peers and parents, acknowledging greater peer-relative-to-parent influence on their views, and perceiving greater models, pressures, and peer approval for drug use. In terms of theory, the users show greater instigation toward problem behavior and lesser personal controls against transgression; given their greater environmental support for marihuana use, its greater occurrence follows as a logical consequence.

The logic of that consequence is strengthened by the findings for the functions of marihuana use. Junior high users report substantially less negative functions or meanings associated with marihuana use, and show a greater discrepancy of positive over negative functions than do nonusers.

Other problem behaviors vary directly with marihuana use, and conventional behaviors tend to vary inversely.

The data for the senior high sample and for the college sample are consonant with the findings for the junior high group, with certain variables being even more discriminating among the older groups.

Considered together, the data from the three samples provide strong support for the hypotheses that marihuana use covaries with other problem behaviors and that the personality and social variables in the network are associated as specified with variation in marihuana use. What is especially intriguing about the consistency of these findings across sex, across school levels, across school contexts, and across different intensities of use or involvement with marihuana is that they suggest the existence of a social-psychological constancy, a continuity in the meaning and function of drug use in youthful society.

Part II: Longitudinal Analyses

Hypotheses 3 and 4 are at issue in the change analyses: First, among nonusers there are initial differences on the variables described above such that they are predictive of the onset of marihuana use over time. Second, there is greater relative change in the problem-prone direction on the measures of these variables over the year's interval for those who shift to user status than for those who remain nonusers.

Comparisons were made between two groups, nonusers in the initial year who remained nonusers by the subsequent year (NU-NU) and nonusers in the initial year who had begun marihuana use by the subsequent year (NU-U). The junior and senior high were combined for these analyses.

The high school data provide support for our third hypothesis. On a number of variables measured prior to the onset of marihuana use, that is, when all the subjects were nonusers, there are significant differences between those who became users by a year hence and those who remained nonusers. The differences are in the theoretically expected, problem-prone direction; they occur on measures of personality, environment, and behavior, and they obtain for both males and females, although stronger on instigators and beliefs for males. Since the measures antedate the onset of marihuana use, the data indicate that they are predictive of its prospective occurrence. Thus the data enable a stronger, although still inferential, claim on a causal role for these variables than could be based on the cross-sectional associations demonstrated earlier.

Since Hypothesis 4 is concerned with the differential magnitude of theoretically expected change over the year interval on the measures of the variables in the network, the procedure employed was to compute residual gain scores for each group based upon the discrepancy between a subject's actual subsequent-year score and the score which would be predicted for him from the regression of subsequent-year scores on initial-year scores.

The residual gain score data provide support for Hypothesis 4. Nearly all the differential changes are in the theoretically expected direction, and a number of them reach significance. Among the females, the group that shifts to using marihuana decreases over the year in value for achievement relative to the group that remains nonuser; the NU-U group, relative to the NU-NU group, increases on the independence-achievement value discrepancy, decreases in intolerance of deviance, decreases in parent-peer

compatibility, increases in social support for drugs, increases in positive functions of marihuana use, decreases in negative functions, and increases on deviant behavior, sex, activism, and times drunk, while decreasing in church attendance and grade point average—all of these changes being significant in magnitude in the theoretically expected direction. The data are similar for the males. It is clear from these findings that amount of theoretically expected change on the variables is associated with the shift in behavioral status, in this case from nonuser to user status. Whether change on the variables precedes or follows the behavioral shift cannot be determined from these particular findings.

The college study data are not supportive of the longitudinal hypotheses in the way high school study data are. There is no support at all from the college study for Hypothesis 3. With respect to Hypothesis 4, some support is evident, but it is modest: None of the motivational instigator variables show significant change differences; among the belief variables, alienation residual gain scores for the NU-U females and social criticism for the NU-U males do show the relative increase as expected; with respect to personal controls, there is a decrease in intolerance of deviance for both male and female NU-U groups, but it is significant for females only; social support for drugs increases significantly for both sex groups as does the positive-over-negative functions discrepancy score; but none of the behaviors, problem or conventional, show a significant difference in residual gains between the NU-NU group and the NU-U group.

Marihuana Use and the Social Psychology of Problem Behavior

The primary concern of this article has been to establish the relevance of a more general social psychology of problem behavior to the specific behavior of marihuana use in youth. Marihuana use was considered functional and adaptive, like other socially learned behavior. Cross-sectional differences between nonusers and users, or between youth relatively less involved with marihuana and youth relatively more involved, were demonstrated at the junior high, senior high, and college levels, for both males and females, on a variety of personality, social, and behavioral variables. These same variables were then shown to be predictive, over time, of the onset of marihuana use among previous nonusers, and to evidence greater theoretically expected change over the year interval among those who became users relative to those who remained nonusers. The longitudinal findings are of special importance since they rely upon measures of variables which were made prior to the initial occurrence of marihuana use and, therefore, are predictive of it in a stronger sense than that term is usually used. Taken together, the replicated cross-sectional findings across school levels, sexes, and intensities of use and the general consonance of the cross-sectional with the longitudinal findings add up to compelling support for the social-psychological network in which marihuana use was embedded.

That support makes clear that personality as well as environmental factors play a significant role in the variation of social behaviors such as marihuana use. This role of the personality variables is important to emphasize because of the tendency in contemporary social behavior theory to give excessive attention to the situation.

The continuity of the patterning of variables in the three different school level samples, for both sexes, is note-

worthy. Despite the 10-fold difference in prevalence between junior high and college, the same variables distinguish the nonusers from the users or the moderate from the heavy users. This social-psychological constancy implies that the meaning of marihuana use is quite pervasively shared and that there are in operation processes of socialization and even institutionalization to which youth of all ages are exposed. There are at least two differences between the high school and college levels that bear mention. First, the variable of social criticism, while operating similarly at both levels, is substantially more related to marihuana use in college than it is in high school. Second, low expectations for achievement, while significantly related to marihuana involvement in the junior and senior high samples, shows no such relation at the college level. These two findings suggest a possibly greater ideological role of marihuana use in college and less of a role in coping with failure than may be the case with marihuana use in high school. While the college cross-sectional data neatly paralleled the high school cross-sectional data, this was not the case for the longitudinal findings. Whereas the same variables were strongly predictive in the high school findings of the shift from nonuser to user status, there was no support for such an outcome in the college findings. Part of the explanation may lie in the relatively high rates of use among our college sample. By the second year (1971), 70 percent of the students had used marihuana more than once, a percentage high enough to provide a modal norm of use. Under such circumstances of widespread use and availability, the prediction of onset may depend more on factors such as the crowd one happens to find oneself in or the vicissitudes of a particular relationship than on the systematic pattern of variables specified in the problem behavior theory. Other factors which were not measured here, such as a negative orientation toward taking any drugs or medications at all, for example, may also sustain nonuse; but once use is begun, for whatever reason or under whatever situational vagaries, a process of peer socialization may well get started which influences the new user in the direction of other users and away from nonusers on a variety of personality, social, and behavioral attributes.

The present findings, while emerging from a particular orientation, are consonant with those reports in the literature which have shown concern for social-psychological aspects of drug use. Beyond their consonance with the work of others, the present results gain strong support from their similarity to findings in our own analyses in the larger project of other areas of significant social behavior and behavior change.

The utility of the present social psychology of problem behavior is enhanced by the scope of its applicability. Problem behavior theory helps to reveal the social-psychological commonalities between marihuana use and other behaviors, rather than following the relatively sterile course of emphasizing its uniqueness.

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Cycloheximide Affects Memory within Minutes after the Onset of Training

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When mice are given brief discrimination training in a T-maze following intracerebral or subcutaneous administration of the protein synthesis inhibitors cycloheximide or acetoxycycloheximide, their learning curves are indistinguishable from saline-injected controls. Retention measured 3 hours after training is also identical in the drug-treated and control groups, but 6 hours after training the drug-treated mice exhibit a striking impairment of retention.

These results suggested that cerebral protein synthesis is not required for retention for at least 3 hours after training. We now report that using an alternative training procedure a cycloheximide-sensitive component of memory storage can be detected within minutes after the beginning of training. This suggests that in some circumstances cerebral protein synthesis may be required for normal expression of memory within minutes after learning has begun.

We trained mice in an automated discrimination training apparatus. Mice were secured by the tail in the center of a circular platform, facing the perimeter, and rotated for each trial to one of three positions. At each position, a mouse could escape shock by touching the smaller of two stainless steel objects. The mice were injected with 120 mg./kg. cycloheximide or saline subcutaneously. Determination of incorporation of ^{14}C-leucine into cerebral protein indicated that more than 95 percent of cerebral protein synthesis was inhibited 10–40 minutes after injection. When mice were trained for 69 trials beginning 30 minutes after injection with cycloheximide or saline, their learning curves were not distinguishable for the first 15 to 25 trials. This observation corroborates earlier reports that performance during initial training for up to 27 trials is not affected by cycloheximide and that initial training in maze tasks, which requires fewer than 20 trials, is also not affected. However, beyond the first 15 to 25 trials the learning curves diverge, and thereafter the cycloheximide group did not improve as rapidly as the saline group.

The divergence of the learning curves at trials 15 to 25 occurred about 40 minutes after drug injection. At about 45 minutes after drug injection, mice also became markedly hypoactive and remained so for several hours. Because of the coincidence of these effects of cycloheximide on training and on locomotor activity, we investigated the possibility that retarded acquisition in cycloheximide-treated mice might be related to depressed motor activity. Mice were trained 10 minutes rather than 30 minutes after subcutaneous injection of cycloheximide or saline. Since training for 69 trials takes approximately 25 minutes, hypoactivity does not develop until after training is completed. If locomotor depression is the cause of the acquisition deficit, the deficit should not appear. Alternatively, if the learning deficit in cycloheximide-treated mice is related to inhibition of cerebral protein synthesis, the deficit in acquisition should be about the same in both conditions. A deficit did appear when training began 10 minutes after injection and the divergence in learning curves was first noticeable beyond trials 15 to 25, whether training

began 10 or 30 minutes after injection.

We also trained mice 210 minutes after injection of cycloheximide or saline. Mice are hypoactive at this time and are visibly sick, although only 80 percent of cerebral protein synthesis is inhibited at this time in this strain of mice. If the deficit in acquisition is due to locomotor depression or to cerebral abnormalities resulting from a period of extensive inhibition of protein synthesis, an impairment in acquisition should also be demonstrable in mice trained at this time. Alternatively, if the deficit which we have observed is due specifically to more than 80 percent inhibition of cerebral protein synthesis during training, a deficit might not appear in mice trained 210 minutes after injection. No deficit was observed.

We also considered the possibility that cycloheximide might interfere with performance by simply preventing mice from ever executing a high percentage of correct choices in this task. Saline-treated mice which had been trained for 69 trials were divided into matched groups and 1 day later were retested by exposing them to 69 additional trials 30 minutes or 210 minutes after cycloheximide or saline. If protein synthesis inhibition or side effects of the drug make it difficult to achieve high levels of performance in this discrimination task, then performance should be impaired by cycloheximide injection before retest. Alternatively, if the deficit is related to inhibition of protein synthesis required specifically for the development of memory during initial learning, then performance of an established habit should not be impaired by cycloheximide injection before retest. The results indicate that cycloheximide had no measurable effect on performance of the previously learned habit.

We suggest that a memory storage process dependent on protein synthesis may be required for as long as performance improves within minutes after the onset of training. In other experimental situations, this may have been overlooked, because only brief training was given.

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Involvement of Biogenic Amines in Memory Formation: The Central Nervous System Indole Amine Involvement

Adrian V. Rake

Research has supported the theory that biogenic amines, particularly the catecholamines, are involved in the biochemical sequences ultimately leading to memory. Further, it has been observed that decreased indole amines can be associated with an increase in learning ability in such a way that it could ultimately affect long-term memory of a training event.

While the notion has been advanced that CNS indole amines may be important during the training event but unimportant afterwards, in the work reported here it is shown that CNS indole amines can be important after the training event at least in certain situations. There is no guarantee that the drugs used are having their behavior effect by action on the CNS indole amine levels rather than by an unknown indirect action. However, this last possibility has been reduced by the use of two drug systems related only by their interaction on the indole metabolism.

Experimental Methods

Subjects were 6 week-old female CF-1 mice. The animals were allowed individually to freely explore the experimental apparatus for 10 minutes of the day before, for the reserpine experiment, or 2 days before for the parachlorophenylalanine (PCPA) experiment. The training consisted of stepping from a small intensely lighted compartment into a large dark compartment through a 1-inch hole. The animals were held in the small compartment by a barrier for 30 seconds before the hole was exposed. The training latency to step through the hole averaged around 13 seconds with no animal lingering longer than 45 seconds. Upon all four feet passing through the hole a foot-shock was administered until the animal returned into the starting lighted compartment. The barrier to the hole was immediately replaced, the animals were removed, and all drugs or saline given interperitoneally within 1 minute after training and before returning the animal to its home cage.

One group of animals given saline after training was injected with reserpine 24 hours later. The PCPA was administered four times before training at 300 mg./kg. each time, once a day for 3 days before training and also the morning of the training. These animals were trained in the afternoon, some 4-5 hours after the last injection. All drugs were dissolved in saline except reserpine phosphate which was dissolved in water.

The animals were tested for the step-through latencies 8 days later for the reserpine experiment or 14 days later for the PCPA experiment in the same manner as the original training. Results were recorded both as the average and standard deviation of latency of step-through for each experimental group of mice and as the number of mice of closely related latencies, in terms of minutes to step through, within the experimental group, thus showing the distribution of latencies. Latency of 0 to 1 minute was considered as showing no memory, 1+ to 4 minutes as showing poor memory, 4+ to 7 minutes as fair memory, and 7+ to 9 minutes 59 seconds as good memory; the latency cutoff point was 10 minutes, arbitrarily scored as perfect.

There were 10 animals in each experimental group.

Results

3.0 mg./kg. of reserpine immediately after training severely repressed the memory as measured by latency of step-through tested 8 days later. The results are recorded both as to number of animals with closely related latency times and as to average and standard deviations of latencies for the whole experimental group. The reserpine-treated animals had significantly lower latencies than the saline-treated control animals. This dose of reserpine completely sedated the animals within 3 hours after drugging, and the animals appeared somewhat sluggish 24 hours later. If the reserpine drugging was delayed for 24 hours, the drug had no apparent effect on memory when tested 7 days after the drugging or 8 days after the training.

Reserpine has been reported to significantly lower the CNS levels of both catechole and indole amines within 1 hour after injection. In order to determine, if possible, which CNS amine was important. either dihydroxyphenylalanine (DOPA) or 5HTP was given to try to reverse this reserpine effect. The mouse received the two injections, one of reserpine followed immediately by the tentative reversing drug, DOPA or 5HTP, immediately after training. Unlike our earlier results, both DOPA and, surprisingly, 5HTP were equally effective in restoration of apparent memory to normal levels. DOPA or 5HTP by itself had no statistically significant effect on memory. Three hours after drugging the reserpine and DOPA animals were only slightly if at all sedated whereas the reserpine + 5HTP animals were sedated to a point about midway between normal and completely sedated reserpinized animals.

To pursue the 5HTP effect, the animals were treated with PCPA for 3 days before training to insure depletion of brain indole amine levels at the time of training. As expected, the PCPA reduction of CNS indole amines at the time of training enhanced memory; the PCPA-treated animals' latencies were significantly higher than the saline-treated control animals. Restoration of CNS indole amines with 5HTP immediately after training restores the PCPA-improved memory to normal levels.

Discussion

In examining the formative phase of memory as opposed to the acquisition phase of learning, the importance of injection of drugs after training is obvious. The increased learning resulting from PCPA drugging during the learning phase ultimately reflects on the animals improved long-term memory. Only drugging after training affects the distinctive formative phase of memory which presumably starts after the first training trial and must continue after the actual training has ceased. The formative phase may be interrupted by various agents, such as electric convulsive shock, reserpine, a second foot-shock, or protein synthesis inhibitors such as puromycin and cycloheximide. Such interruptions of the formative phase affect the subsequent long-term memory. The effect of PCPA given before training must, then, be on both the acquisition phase and on the formative phase of memory; as such its effect may lead to complex results.

By waiting several days after the drugging one can be sure that the supposed experimental effect is not due to drug-induced unresponsiveness of the animal at the time of testing. Reserpine given 24 hours after training had no effect on memory, indicating that

the memory depression effect of reserpine 1 minute after training was not due to drug-induced unresponsiveness and that the formative phase of memory does not extend for 24 hours after training.

In confirmation of our earlier results on a different strain of mice in a different training situation (two-way shuttlebox active avoidance), reserpine depresses memory formation and this depression can be alleviated restoring memory to its normal levels by simultaneous DOPA drugging.

The 5HTP drugging results on memory formation are contradictory and no simple explanation can satisfy questions posed by the experimental data. The restoration of normal levels of memory is approached by 5HTP from two different directions, reduced reserpine memory and increased PCPA memory. The reversal of the PCPA effect on memory with 5HTP is more easily explained on the basis of the model for memory formation involving rehearsal, nerve circuit reverberation, or the "integrative-distributive-elaborative-facilitative phase." 5-HTP, or more likely serotonin, acting as an inhibitor, might damp this type of reverberation or facilitation;reduction of the indole amines by PCPA during the formative phase of memory would lead to more reverberation or facilitation and subsequently stronger long-term memory. Restoration of the indole amines by 5HTP drugging would reintroduce the circuit-damping effect, restoring memory to its normal levels.

If this mechanistic explanation of events is true then the 5HTP reversal of the reserpine-reduced memory is truly difficult to explain. Even more difficult to explain is the restoration of reserpine-reduced memory by both catechole and indole amines. The fact that either DOPA or 5HTP alone will apparently completely restore memory to normal levels is an enigma. Another enigma is why in our early experiments we were unable to show any indole amine effect.

A tentative partial explanation for the confusing results is offered in that the indole amines are more important in passive avoidance than are the catecholamines, which are important in active avoidance. The two-way shuttlebox is a strictly active avoidance task and perhaps only catecholamines are involved. The one-trial step-through as used here, although called passive, is actually composed of two phases, the passive phase of not stepping through and the active phase, after stepping through, of escaping the shock to the "safe" compartment. It may be that the catecholamines are associated with the active phase and the indole amines with the passive phase. Thus perhaps indole amines act similarly to the catecholamines in facilitating the synaptic function of recently fired neurons but only in a passive avoidance situation. That the different amines could be involved in different roles and different behavioral situations is borne out by other work involving positive and negative reinforcement. Although the explanation, useful for designing future experiments, is not as straightforward as one would wish, the result is clear. The manipulation of indole amines during the formative phase of memory has effects on long-term memory, and normal levels of indole amines are necessary for normal memory strength.

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Achievement Place: Experiments in Self-Government with Pre-Delinquents

Dean L. Fixsen, Elery L. Phillips, and Montrose M. Wolf

Youths and adults in correctional settings rarely participate in decisions regarding the rules they have to live by. Administrators, professionals, and caretakers generally establish rules and policies dictated by security precautions and the requirements of a particular approach to treatment. In spite of formal regulations, many institutions develop an informal self-government dependent upon group coercion and punishment that often is more severe than that allowed by rules. The influence of the peer group in informal self-government systems has been widely acknowledged by prison and reform school administrators, school officials, probation officers, and parents. Moreover, much peer group influence is for antisocial behavior.

The attempt has been made in many treatment programs to reduce or eliminate the influence of the peer group in order to carry out the goals of the program. On the other hand, the development of the skills involved in self-government systems has been a primary goal in a few treatment programs.

The purpose of these experiments was to analyze the variables that affect the youths' participation in establishing consequences for rule violations (Experiment I) and for calling "trials" for reported rule violations (Experiment II). Also, the data in Experiment I were analyzed to determine the role of the youths in reporting violations.

Setting

Achievement Place is a residential group home for six to eight court-adjudicated delinquent, predelinquent, and dependent-neglected boys 12 to 16 years old. The home is governed by a Board of Directors of community members. It is directed by professional teaching-parents who are responsible for treatment, care, and custody of the youths. The teaching-parents live in the home and are the sole staff of Achievement Place.

The treatment program is based upon a token economy and treatment procedures that were developed during 5 years of research. The tokens at Achievement Place take the form of points given for appropriate behavior and are taken away for inappropriate behavior. At the end of each day, the boys subtract the points they have lost from the points they have earned. The difference is accumulated during the week and the weekly total is used to purchase privileges for the following week. A boy can "live comfortably" by purchasing privileges valued at 15,000 points each week. Most boys average about 25,000 points each week. By earning the extra points, a boy can permanently return to his natural home.

Achievement Place is a community-based program. The boys continue to attend the same school, retain frequent contact with their parents, see their friends, and have contact with the community. When a boy enters Achievement Place his behavior problems do not automatically go away, of course. So that consequences can be arranged for the problem behavior, the youth's teachers, school officials, and parents are encouraged to report any misbehavior to the teaching-parents. The teaching-parents and the youth's peers at Achievement Place

determine these consequences by developing rules for behavior in the school, home, and in community, as well as at Achievement Place.

Development of the Self-Government Systems

The semi-self-government system at Achievement Place evolved over about 1 year. The boys did not have the self-government skills when they entered. They first learned to live under a system of rules established by the teaching-parents. Some of the boys began asking the teaching-parents to make rules to keep the other boys out of their rooms, to stop the other boys from borrowing their clothes and belongings without permission, and to reduce the teasing and bickering that sometimes occurred among the boys. The teaching-parents used these complaints to teach the boys how to make reasonable and fair rules. In the family conference, the teaching-parents asked the boys to make their own rules to govern behavior they complained about. At first, the boys made very strict rules and established extremely large consequences for anyone who violated the rule. Within a week, someone usually violated the rule and the teaching-parents gave the violator the established consequence. At the next family conference, the rule and the consequence were discussed and the fine was usually reduced to a more appropriate level. After a few weeks, the boys learned that the rules applied to all the boys and not just to the boy who was the subject of the original complaint. They appeared to learn the cardinal rule of democratic self-government: The "decisionmakers" as well as the rule violators have to abide by the same rules. The boys seemed to learn to establish rules that were fair, rules they could "live with," rather than rules that were punitive. Also, they seemed to learn how to modify a rule until it was as satisfactory as possible.

As the boys established more rules they reported more violations to the teaching-parents. Occasionally, a boy would report misbehavior that occurred at school or in the community. The teaching-parents wanted to encourage peer reporting of the more serious misbehaviors and gave 1000 to 5000 points to a boy who reported such misbehaviors. In addition, they gave the boy a fine of up to 5000 points if he knew of a serious misbehavior but did not report it. As the number of peer reports increased, the teaching-parents withdrew the point rewards and fines and now only occasionally use the point consequences for boys who are new to the program.

As the number of rules and reports of rule violations increased, the teaching-parents began discussing the rule violations at family conferences. The teaching-parents would question the accused boy about the circumstances surrounding the reported rule violation, discuss the evidence gathered from various sources, and discuss the rule violation in terms of how it might affect the relationship between Achievement Place and the Juvenile Court or the Welfare Department, how the Board of Directors might react, how it would affect the reputation of Achievement Place, and what that reputation meant in terms of giving other boys a "second chance." The teaching-parents would also discuss the reasons for assigning a particular consequence for a rule violation. After a few weeks of discussing the rule violation, the boys began to participate in the discussions concerning guilt and consequences. At first, the teaching-parents would give each boy 500 to 2000 points, depending upon how much he participated. Eventually, the

points for participation were eliminated except for occasional points given to a new boy.

In addition to the "trials," the youths were encouraged to criticize any aspect of the program they wanted to change. They were required to present reasons why they wanted to change the program and were asked to present a constructive alternative. In these discussions, the teaching-parents would remind the youths of the goal of the procedure being criticized and would consider any alternatives that would promote that goal and rectify the problems. If two or more alternatives met both criteria, the youths would vote on which alternative to put into effect. Sometimes a youth would complain about the program without presenting reasons for the criticism or constructive alternatives. If the youth persisted this was sometimes considered a rule violation and a trial was called to decide the consequences. Thus, the conference was a place to discuss requests for change and not general complaints that were not justified by a youth.

After the piecemeal development of the self-government system, the teaching-parents began to be more systematic in carrying out each trial until the trial procedure was developed. The boys who were in Achievement Place when the trial system was developed have graduated and returned to their natural homes and families. However, the trial systems continued relatively unchanged. With a gradual turnover in the population, the youths who were new quickly learned the rule-making, reporting, and participation skills involved in the semi-self-government system.

The description of the evolution of the semi-self-government system is, of course, post hoc and anecdotal. However, the self-government system based on the Achievement Place model has been replicated in other homes for adolescent, court-adjudicated boys and girls. Apparently, when the necessary self-government skills are objectively defined these skills can be taught in a relatively short time.

Experiment I

Experiment I was conducted to analyze some of the variables that affect the youths' participation in the self-government system and to determine the extent of the participation.

Seven delinquent and predelinquent boys who resided at Achievement Place participated in the experiment. Ages ranged from 10 to 16 years with a median of 15 years. At the end of the study, which required 4 months to complete, the boys' median length of residence was 8 months and ranged from 3 to 40 months.

Each day, the teaching-parents recorded reports of misbehavior or rule violations by a youth from his teachers, school officials, parents, and the youth's peers. They also recorded violations they personally observed. Teachers and parents were unaware of the rules at Achievement Place but reported misbehavior that caused some disruption at school or at home. The peers reported violations directly to the teaching-parents by describing the situation surrounding the alleged violation and a youth's behavior in that situation. Many violations were not serious and would probably result in fines of 3000 points or less. In these cases, the teaching-parents fined the youth the appropriate number of points. Other reported violations, however, were more serious and would probably result in point fines of more than 3000 points. In these cases, the teaching-parents had the option of fining the youth the appropriate number of points or letting the youth's

peers decide the consequences at the conference. In either case, in the conference, the youths had an opportunity to review the violation and establish a new consequence or confirm the consequence given by the teaching-parents.

Family conference—Each day, at the evening meal, a family conference was held. The conference provided a time and place for any complaints or discussions of any aspect of the Achievement Place program. The conference also provided a time for the "trials" (as the boys came to call them) to occur. The teaching-parents called a trial for any misbehavior that would probably result in a point loss of 3000 points or more and that was reported by teachers, parents, the boys, or the teaching-parents themselves. The trial procedure was as follows:

The teaching-parents would identify which boy the trial was about and then ask the boy whether he did what he was accused of or not. After the youth stated whether or not he was involved in the violation, the teaching-parents asked for discussion of the incident. These discussions were restricted to information that might bear upon the youth's "guilt" or "innocence."

After the discussion, the teaching-parents asked "How many of you agree that he did it?" and "How many of you agree he didn't do it?" If the vote was not unanimous, the teaching-parents would ask those who voted in the minority to offer their reasons for dissenting, would call for discussion, then would ask for another vote. On the second vote, the majority was taken as the opinion of the group.

If the majority voted that the boy was "not guilty," the trial ended. If the majority voted that he was "guilty," the teaching-parents asked for a discussion of the consequence that should be applied.

When the discussion was completed, the teaching-parents summarized the consequence more or less decided upon in the discussion and called for a vote on "How many agree with this consequence?" If there were dissenting votes, those voting in the minority were asked to give their reasons, discussion followed, and a second vote was taken. On the second vote, the majority decided the consequence.

Peer responsibility—All boys, including the accused boy, and the teaching-parents participated in the discussions of guilt and consequences. However, neither the accused boy nor the teaching-parents voted on the issues of guilt or consequences. Nevertheless, the teaching-parents did have veto power over the group's decision on consequences. If the boys voted to levy a fine that the teaching-parents considered to be much too low, the teaching-parents could disagree and suggest that the boys agree to take responsibility for any similar violation that the boy might commit. If the boys chose to accept responsibility, it meant that the teaching-parents would set the consequence for any similar violation that the accused boy might commit and all the boys, not just the violator, would be given the consequence at that time. If the boys chose not to accept this responsibility for their peer's behavior, the teaching-parents would suggest the minimum consequence they would be willing to accept and steps three and four of the trial procedure would be repeated. Thus, the teaching-parents could veto the group's decision on consequences but the veto could be overridden if the boys agreed to take responsibility for any similar violation by the same youth in the future and potentially accept the consequences

themselves for similar offenses of the youth.

Behavior definitions—"Agreement" was defined as a youth raising his hand after a vote was called. If more than one vote was taken, the results of the second vote were used for data for this study.

"Participation in discussion" was defined as a youth suggesting alternatives, adding information, or making a statement that was related to the discussion taking place. In each case, a youth had to do more than agree with what had been said.

Observation—Each conference was videotaped. The boys would set the camera, hook up a microphone, and test the system to make sure it was working. One boy would start the recorder when dinner was ready and turn off the system when dinner was finished. An observer replayed the tape and recorded the names of the boys who participated one or more times in the discussions of guilt and consequences for each trial and recorded the vote of each boy for each decision. Because the number of boys attending each trial varied from four to seven, the observations were converted to the percentage of boys participating in each discussion and the percentage voting in agreement on guilt or consequences.

Experimental Conditions

Trial-set consequences—In this condition, the teaching-parents recorded any reported violation that would probably result in at least a 3000-point fine. No consequences for the violation were delivered before the trial by the teaching-parents. At the conference, the teaching-parents would call a trial on the boy accused of violating the rule and the boy's peers would decide his guilt or innocence and what consequence to deliver, if any.

Preset consequences—In this condition, the teaching-parents recorded any reported 3000-point (or more) violation and delivered a consequence to the boy *at that time*. At the conference, the teaching-parents would call a trial on the boy accused of violating the rule and the boy's peers would decide his guilt or innocence and what consequences to deliver, if any. The only change in the procedure was that the teaching-parents would tell the group how many points they had fined the boy before asking for a discussion. The boys were free to modify any preset consequence and the decision on consequences took precedence over the teaching-parents' preset consequence.

Unfair consequence probe—The teaching-parents made every attempt to preset consequences that were fair and appropriate to the violations. For two trials, however, the teaching-parents set a consequence that was 10 times greater than what they considered to be fair.

Preference probe—Near the end of this experiment, and after the data collection was terminated, the boys were asked on several trials whether they preferred to have the teaching-parents preset the consequences for violations or to have the consequences decided by trial decisions. The preference measure was taken for nine trials that had preset consequences and for three trials that had trial-set consequences. The preference question was asked sometimes before a trial began and sometimes after a trial was completed.

There were 80 trials. However, due to mechanical problems, data were lost for nine trials. The 80 trials occurred over 14 weeks for an average of 5.7 trials per week and averaged about 18 minutes in duration.

Participation—During the first trial-set consequence condition where

the teaching-parents did not preset consequences and the peers decided the consequence for rule violations in the trial, there was a median of 80 percent of the boys participating in each trial. When the teaching-parents began delivering consequences before each trial in the preset consequence condition, the percentage dropped to a median of 40 percent. When the trial-set consequence condition was reinstated, the percentage of boys participating increased to a median value of 83 percent and decreased to a median of zero (mean of 11.8 percent) when the teaching-parents again began presetting consequences.

The unfair consequence probe occurred during the second preset consequence condition. The percentage of participation increased sharply when the teaching-parents preset a consequence that was judged by them to be inappropriate to the violation.

The percentage of boys who participated in each trial decision regarding guilt did not vary systematically with changes in the conditions. This was primarily due to the fact that the boys admitted their guilt 74 times out of 80 trials. There were only three guilty and one innocent verdicts by trial decision, and in two trials there was no decision due to conflicting evidence. Thus, the participation in decisions of guilt or innocence was uniformly low across all conditions.

Agreement—There was 100 percent agreement on all but two trial decisions of guilt. The exceptions were trials where guilt or innocence was not decided due to conflicting evidence and no vote was taken.

There was 100 percent agreement on all but one trial decision regarding consequences, where agreement was 83 percent. For the two trials that were unfair consequence probe trials, none of the boys agreed with the first unfair consequence and only one boy of seven agreed with the second unfair consequence. After the boys discussed a more appropriate consequence and voted, there was unanimous agreement on decisions. On the first unfair consequence trial, the youths reduced the consequence of a 100,000-point fine to a warning of a 20,000-point fine the next time the youth violated the same rule. On the second trial, the youths reduced the 50,000-point fine to 4000-point fine.

The teaching-parents disagreed with the peer's decision on consequences only three times. On these occasions, the teaching-parents asked the peers to accept responsibility for similar violations committed by the youth. On one occasion, the peers agreed to accept this responsibility and agreed that they would all accept a 100,000-point fine if the same youth committed a similar violation. On the other occasions, the peers agreed not to accept this responsibility and voted to set a higher fine for the violation, a fine that was considered more appropriate by the teaching-parents.

Preference—On 12 occasions the boys were asked whether they preferred the trial-set consequence condition or the preset consequence condition. The boys' preference after four preset consequence trials was unanimously in favor of preset consequences. Their preference before five preset consequence trials was unanimously in favor of preset consequences on four trials and in favor of trial-set consequences on one trial. The boys' preference before and after all three trial-set consequence trials was in favor of trial-set consequences.

Descriptive trial data—In the preset consequence condition, there was an opportunity to compare the consequences preset by the teaching-parents with the consequences agreed upon by

the boys. Out of 53 trials. the boys agreed with the teaching-parents on 62 percent of the trials, increased the consequences on 6 percent of the trials, and decreased the consequences on 32 percent of the trials. The boys left the preset consequence the same most often for rule violations that were reported by school officials and least often for rule violations reported by the teaching-parents.

The boys fined their peer a number of points on 46 of the 80 trials. On 22 trials, however, they employed a consequence that did not involve points. These nonpoint consequences included having a boy take a "daily report card" to school each day, take his lunch to school to avoid trouble in the lunchroom, calling the teaching-parents at designated times on weekends, warnings of future point consequences, and others. For 12 trials, the boys decided upon a consequence that had both point and nonpoint components. For all 80 trials there was a total of 1,020,750 points lost in 58 fines. The mean fine was 17,600 points and the median was 5000 points.

The parents reported only those misbehaviors that occurred in the natural home, and school personnel reported only those violations that occurred on school property. The teaching-parents primarily reported rule violations that occurred at Achievement Place but also reported a few violations that occurred in the community and at school. About half of the peers' reports concerned rule violations that occurred at Achievement Place and the other half was divided between violations that occurred at school and in the community. Overall, nearly half of all violations that were reported occurred at school and about one-third occurred at Achievement Place. More importantly, however, more than one-third of all violations were reported by peers.

The violations ranked in order of seriousness from stealing to not being prompt. Of the first four types of rule violations, the peers reported a majority of the violations in three of the four categories and reported as many as the school personnel in the fourth. Thus, of the 27 rule violations reported for the four most serious violations, the peers reported 15, school personnel reported eight, and the teaching-parents and parents each reported two. The peers also reported rule violations in each of the seven categories.

Four of the peer-reported violations were self-reports, where a youth reported a violation he had committed. Of these four self-reported violations, one was for stealing, two were for physical aggression, and one was for violation of Achievement Place rules.

Experiment II

Experiment II was conducted to analyze the effects of some variables on the youths' participation in calling "trials" for reported violations.

Six boys who had been adjudicated by the juvenile court and placed in Achievement Place participated. Four of these boys also participated in Experiment I. Ages ranged from 13 to 15 years, with a median of 14 years.

Under the first condition, the boys were asked to report to the teaching-parents any violations committed by their peers. The boys did not earn points for reporting. If the reported misbehavior would, in the teaching-parents' opinion, merit at least a 3000-point fine, the teaching-parents called a trial on that misbehavior at the next conference and the peers decided upon a consequence. This procedure resulted in an average of 1.4 trials per day over a 9-day period.

The second condition was identical

to the first except the boys had the responsibility to call for a trial. Under this procedure, when a boy reported a rule violation to the teaching-parents he was asked whether he wanted to call a trial on that violation. If the reporter answered "no," the teaching-parents gave the violator what seemed to be an appropriate consequence without going through the trial procedure. If, however, the peer reporter wanted to call a trial, the teaching-parents brought up the violation at the next conference and the boys decided the consequence. The average number of trials per day decreased to 0.1 over a 7-day period. These effects were then replicated in the next two conditions. When the teaching-parents again began calling trials, the average number of trials per day increased to 1.6 over an 8-day period and decreased to an average 0.3 trials per day over 8 days when the boys again called the trials.

The fifth condition was identical to the previous condition except that the boys earned 500 points for calling a trial on a violation they reported. Under this condition, the average number of trials per day increased to 5.7. This condition was terminated after 3 days because of the amount of time required to hold five trials each day. In the last condition, the boys no longer earned points for calling a trial and the average number of trials each day decreased to 0.3 over 3 days.

During the conditions where the teaching-parents or the youths called the trials and no points were earned for calling trials, the average point fine was 2100 points. During the condition in which the boys earned points for calling trials, only one of the 17 trials resulted in a fine and that fine was 500 points.

The results indicate that self-government can be studied and that variables affecting participation in a governmental system can be identified and evaluated. The results of Experiment I indicated that more youths participated in the governmental system when the teaching-parents did not predetermine a consequence for a reported rule violation. However, the results of Experiment II showed that the youths called few trials when they had the responsibility for calling the trials. When the teaching-parents paid points for calling trials there was an increase in trials called by the youths, but the violations reported were what might be called "technical violations" of rules that rarely resulted in a point consequence for the violator. Thus, at this time, it appears that teaching-parents cannot turn over full responsibility for the self-government system to the youths.

Preference data indicated that the youths preferred whatever trial system was being used at the time the preference measure was taken. Since there was no marked preference, the teaching-parents might use either preset consequences or trial-set consequences, depending upon the situation.

The semi-self-government system that has evolved at Achievement Place consists of at least four important components: developing rules, reporting rule violations, deciding guilt, and assigning consequences. A recent review of 99 rules at Achievement Place indicated that in the boys' opinion they had developed about 50 percent of the rules and had played a major role in the development of another 25 percent of the rules. The boys not only played a major role in establishing the rules, they also reported violations. The boys reported 30 of the 80 violations that resulted in a trial, more than the number of violations reported by school personnel, the teach-

ing-parents, or natural parents. Although in 74 of the 80 trials the accused boy admitted his guilt, the boys did have to determine the accused boy's guilt or innocence in six trials. In three cases the accused boy was declared guilty, one boy was declared innocent, and two trials were undecided. For 58 trials, the boys levied fines that totaled more than one million points. For 22 trials, the boys established nonpoint consequences. The results appear to confirm anecdotal descriptions that indicate delinquent youths can be taught the skills involved in the democratic decision-making process.

When the self-government system began, the decisions about the goals of the program and the point system had been made. The community agencies and representatives gave their support to instituting a self-government system that would increase the boys' participation in the treatment program. The one self-government issue that generated discussion was having the boys report the misbehaviors of their peers (some called it "squealing," "informing," "tattling," being a "stool pigeon," or "ratting"). Was peer reporting an example of "ratting" or of "good citizenship"? Was this a "big brother" or a "natural family" behavior? In these discussions an important distinction was made. "Ratting" and "informing" were seen as reports of misbehavior to an authority or agency that used the information in a way that could not be controlled by the informant. This was seen as "big brother" behavior. However, "reporting" was seen as giving information about a peer's misbehavior to an authority (the teaching-parents) whose function was later (at the conference) to bring the matter before the accused youth and his peers for *their decisions* concerning his guilt and the consequences of his behavior. Thus, the "reporter" maintained some control over the outcome of his reporting. This was seen as a behavior that occurred in most "natural families."

Although these issues have been fairly well resolved by the teaching-parents, community agencies, and citizens, these issues will probably arise when similar programs are started in other communities. It is important to note that the objective specification of goals and treatment procedures that are among the strengths of the experimental analysis of behavior also increase its exposure to criticism and feedback from other professionals and the public. It seems important, therefore, for behavior modifiers to develop treatment programs that take into consideration the ethical and moral standards of society as well as the opinions and preferences of those who have any input into the program. In this way, we can develop programs that are not only effective but acceptable to potential users as well.

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Guidelines for Behavioral Practice in the Open Community Agency: Procedure and Evaluation

Edwin J. Thomas and Claude L. Walter

Community settings such as the family service agency, community mental health center, child guidance clinic, and mental health clinic, are typically open to virtually all who apply for service. In these agencies, any behavioral difficulty may be encountered and accepted for service. Therapists who use behavioral methods face several challenges in such settings: Clients may terminate prematurely; crises and unstable life situations may disrupt ongoing behavioral therapy; clients may be less amenable to influence and less accessible than in institutions and other closed settings; and countervailing environmental influences may negate change efforts by therapists. Consequently, a different level of behavioral procedure is needed in open settings to augment the abstract principles and specialized techniques that presently constitute the main components of behavioral knowledge and method.

The requisite procedure should aid the practitioner in open settings to approach cases from a behavioral point of view so that his practice activities are organized sequentially and systematically; it should assist the therapist with the challenges of the open setting; the guidelines should have general utility for a wide range of behavioral difficulty; the procedure should be a framework that would permit application of specialized techniques as appropriate in each case; and the framework should allow for the provision of services other than those that involve behavior modification proper.

This paper describes a practice procedure designed to meet some of the requisite conditions mentioned above, reports on a project to demonstrate and evaluate the procedure, and presents results of the project and an appraisal of the procedure.

The Behavioral Procedure (PAMBOS)

The procedure developed for the open setting was called PAMBOS, an acronym for Procedure for the Assessment and Modification of Behavior in Open Settings. The 15 ordered procedural steps follow below along with a brief description of the practice activity involved.

1. *Inventory of problem areas*—The inventory consists of client descriptions of presenting problems as well as problems the therapist discerns in the interview.

2. *Problem selection and contract*—The therapist and client reach an agreement concerning which problem needs attention first.

3. *Commitment to cooperate*—The client is asked to agree to cooperate fully in those activities integral to the procedure, such as providing information, complying with requests, and maintaining regular contact.

4. *Specification of focal behavior*—Samples and instances of the behavioral components of the problem behavior and desirable alternatives are obtained.

5. *Baseline of focal behavior*—Assessment of the frequency, magnitude, duration, or latency of the focal behavior is obtained.

6. *Identification of probable controlling conditions*—Specific information is obtained concerning the events that occur just before, during, and after the emission of problem behavior.

7. *Assessment of environmental and behavioral resources*—Information is sought concerning such environmental and behavioral resources as potential mediators, reinforcers, or aversive conditions that might be made use of in modification.

8. *Specification of behavioral objectives*—The therapist specifies the terminal behavioral repertoire of the client as well as appropriate successive approximations to the desired terminal behavior.

9. *Formulation of a modification plan*—The therapist selects an appropriate behavioral role for him to take during modification and selects modification techniques suitable to achieve the behavioral objectives.

10. *Execution of the modification plan*—Interventions are carried out.

11. *Monitoring the outcomes of intervention*—Changes that occur in the problem behavior and in prosocial alternatives are monitored.

12. *Formulation of a maintenance plan*—The therapist formulates a plan to maintain the behavior following successful modification.

13. *Execution of a maintenance plan*—The maintenance plan is implemented to maintain the behavior.

14. *Monitoring the outcomes of maintenance*—The outcomes of maintenance are monitored.

15. *Followup*—Followup is undertaken using measures commensurate with those used in prior monitoring.

Each of the 15 steps entails concentration on an activity to be completed in sequence for each problem area for which a contract has been made. The rationale for these particular procedural steps may be expressed by stating the assumptions to which the steps relate: Full and accurate information concerning the focal behavior worked on with the client will increase the likelihood of successful modification in the open setting. Modification should be embarked upon only after assessment has been completed. Individualized modification should be undertaken for individuals or families. Requirements for the initial modification of behavior are not necessarily those most appropriate for the maintenance of a behavior following modification. The right of clients to self-determination and voluntary choice must be respected and protected. The likelihood of successful modification will be increased in the open setting by employing guidelines that provide for focused, sequential, and systematic therapist activity. The practitioner who uses the Procedure knows the principles of learning and behavior modification, is familiar with techniques of assessment and modification, and is conversant with the organizational, policy, and service details of the particular open setting where the Procedure is employed.

The Project

The primary objective of the Project was to apply the Procedure outlined above with a sample of clientele having behavioral difficulties typical of those encountered in an open service setting and to appraise the Procedure's adequacy, effectiveness, and efficiency. Family service agencies of two different cities were selected as sites for agency-project collaboration. There were eight Project workers, four in each agency; all Project workers had had at least one graduate course in behavioral principles and techniques.

Cases were sought in which behavioral and adjustmental problems were paramount and that represented a variety of personal and family difficulties. Cases having only medical, legal, or financial problems were not accepted, although any of these diffi-

culties combined with a behavioral or personal difficulty were accepted. Among the problems were depression and anxiety, physical self-abuse, deficits in social skills, parent-child conflicts and disobedience, phobias, obesity, marital conflict, faulty communication, sexual inadequacies, exhibitionism, and school adjustment.

The workers followed the agency rules when working with clients and, when called for, provided referrals, special information, and other social work services. Case supervision was intensive, and data recording was monitored carefully.

Immediately following each period of case activity, appropriate forms were completed by the worker. Data assessment and modification of marital communication were recorded on tape. Some of the results are based upon classification of recorded data and, in these cases, the coding was based upon consensus agreements of two judges. The supervisors prepared weekly feedback memos containing ideas and qualitative appraisals of current work.

During an orientation and training program for Project practitioners the objectives of the research, PAMBOS, the Procedure, assessment and modification techniques, and the system for recording were covered. Additional Project seminars and meetings covered subprocedures relating to marital communication, family processes, observation in the home, and forms for case monitoring.

The Project lasted 8 months. Work on many cases was carried to maintenance, but there was not enough time or Project resources to conduct followup on cases that had progressed into modification and maintenance.

Case Illustration

The case summarized below illustrates aspects of the Procedure and results involving efficacy. This case was not atypical but it had slightly more in-person contacts, more problems dealt with, and more crises encountered.

The individuals in the case consisted of a divorced woman aged 34 and her two sons, aged 6 and 3. Ted, the 6-year-old, had been staying home from school too often, and a contract was therefore made to work on school attendance. Among the probable controlling conditions were that the mother treated Ted as an invalid because he had been sickly. She probably reinforced his staying home; no aversive consequences were evident for Ted's not going to school, and reinforcing conditions for going to school were not strong. The objective of modification was to have the boy go to school every day that he was not sick. In return for going to school, Ted would receive a point each day which could be exchanged for watching TV, coloring, snacks, or having friends over for snacks. The boy's mother and father were instructed to praise Ted for going to school and to ignore all temper tantrums previously associated with efforts to have him go to school. These were carried out as planned. Ted had a rate of 0.43 as the baseline of school attendance prior to modification. For the 15 days following modification he was absent 1 day, a rate of 0.93.

Results

A total of 32 cases were seen which embraced 66 problem areas and involved an average of 11.4 in-person contacts per case and a grand total of 529 procedural steps.

Attrition—Twelve of the 32 cases, or 27 percent, did not progress to the point of modification. The average number of in-person interviews for

these 12 cases was 4.4. For nine cases there were some data about reasons for termination: disappearance of the problem during specification (2); reluctant spouse (2); fee too high (2); stopped because of the recommendation of another helper (1); divorce (1); and noncompliance of client (1).

Departures from procedure—Departures from the Procedure were recorded in terms of the step departed from, the step turned to, and the rationale for the departure. The extent and types of departures provide information concerning the degree to which the Procedural guidelines could be followed. Out of the 32 cases, each of 15 cases had at least one Procedural departure recorded for it with 34 departures recorded for the 15 cases. Virtually all of the departures were from Steps 4–11, with Step 4 being the single step from which most departures were found. Eleven departures were to crisis intervention; an additional 11 were essentially cycles backwards, of which nine involved problem selection. There were 11 forward cycles, seven of which were from earlier steps to those involved in modifications. These seven in effect constituted premature modification involving the direct and unwarranted skipping of steps.

The total number of steps completed was 529 and the total number of permutations for cycling forward or backwards is of course immensely larger than 529. The 34 recorded departures therefore represent a small proportion of the number of possibilities. It is evident that in the main the workers managed to follow the Procedure in a stepwise fashion.

Efficacy—For 18 of the 20 cases that progressed to the point of modification, the modification had been in effect long enough to evaluate efficacy. For these 18 cases there were 48 contracted problems for which there were data on efficacy. For each of the 48 contracted problems the main type of interventional activity was classified. The "programs" of intervention were instigation (instructions of the worker intended to mediate some change of behavior for clients in the natural environment), direct intervention in the office, and direct intervention in the natural environment. Sixty-eight percent of the programs involved instigation; 30 percent involved direct intervention in the office, such as relabeling, training in thought-stopping, relaxation, or behavioral rehearsal. There were no direct interventions in the natural environment in which the worker himself actually provided the intervention while in the natural life situation. Thus, interventions pertained to the efficacy of instigations and to the effectiveness of direct intervention in the office.

Prebase to baseline differences—Information for prebaseline and baseline was available for 10 of the 48 contracted problems. For four of these, the baseline level was an improvement over the prebaseline level. One of the 10 differences involved a decrement from the baseline score, whereas five involved no difference. These differences suggest that there may be more improvements than decrements associated with baseline recording.

Baseline to modification differences—For 34 of the 48 problems there were quantitative data for baseline and modification; data for the remaining 14 problem areas were recorded judgments concerning the improvement or lack of it for the area under investigation. For the quantitative changes, 25 consisted of more than 50 percent gain over baseline, seven showed lesser gains, and two involved no differences or decrements.

For the nonquantitative contrasts, 13 of the 14 were improvements. Altogether 45 of the 48 comparisons were improvements, and most of these were large quantitative gains.

Modification to maintenance differences—For 15 of the problem areas data were available on the efficacy of maintenance. For 10 of the 15 problem areas the gains of modification were sustained or exceeded.

Fate of problem areas—Another way of expressing the efficacy of the Procedure with these clients is to consider the fate of all problems attended to. Of the 66 problems attended to, 61 became contracted problem areas. Forty-eight of these, or 79 percent, progressed to modification. The success percentage for the 48 cases that went to modification is 93. If we add to the 45 successes the four problems that essentially "evaporated" during specification, we have a total of 49 improvements out of a total of 61 possibilities—a total percentage of success of 80.

Concomitant changes — Relevant changes in the client's life situations and in nontargeted behaviors were systematically recorded; changes were discerned and recorded for 26 of the 32 cases.

Changes in nontargeted behavior—Improvements in nontargeted behavior during the course of work on the case were called "bonus" changes whereas adverse changes in nontargeted behaviors were termed "negative" changes. For 14 cases neither type of change was recorded; nine cases had bonus changes, two cases showed both bonus and negative changes, and one case had a negative change. In the main, where changes in nontargeted behavior were found, they were mainly positive.

Influences on case procedure—Influences on procedure may hinder or facilitate sequential and orderly activities of the Procedure. Each of the 26 cases having recorded concomitant changes was examined to determine whether or not there was at least one facilitative or hindering concurrent change. For 13 cases, no such changes were recorded. However, 10 of the 13 changes were negative, and the remaining three involved both negative and positive influences; there were no positive changes without negative changes. Considered altogether, then, for 13 of the entire group of 32 cases there was some negative outside influence on Procedural activity.

Efficiency—Time devoted to all telephone and in-person contacts was recorded. The average number of telephone contacts per case was 10.8 and the average length of the telephone conversation was 9.4 minutes. The average time devoted to direct contact was 11.4 hours per case with an average of 6 hours given to each problem addressed.

Of the contracted problems, an average of about two was worked on per case. The problems successfully addressed were 1.3 per case, based upon 45 problems for which there was improvement, and four problems in which the problem "evaporated," thus yielding 49/61.

Qualitative appraisal of the Procedure—Some of the steps yielded the intended information more fully than others and were areas of Procedural activity in which the workers generally performed well. These areas were the Inventory of Problem Areas (Step 1), Problem Selection and Contract (Step 2), Specification of Focal Behavior (Step 4), Baseline (Step 5), Assessment of Environmental and Behavioral Resources (Step 7), Specification of Behavioral Objectives (Step 8), Execution of the Modification Plan (Step 10), and Monitoring the Out-

comes of Intervention (Step 11). In contrast, the workers had too little experience in the areas of maintenance and followup to warrant making any appraisal.

There were two activities that in general were the most difficult to carry out adequately. One was the Identification of Probable Controlling Conditions (Step 6), perhaps most frequently violated because of the difficulty of obtaining good data. The other was Step 9, Formulation of the Modification Plan, perhaps the most demanding step in the Procedure because of the many complex factors to be weighed.

Commitment to Cooperate (Step 3) raised some special questions. Although the commitment could be obtained and it often seemed to facilitate cooperation, there were some noteworthy instances of noncompliance.

Considering the Procedure in its entirety, it did serve the objective of conducting behavioral practice in an orderly and systematic manner. Occasionally it was necessary for the workers to provide services not relating to modification with brief interruptions in the procedural sequence. Interference due to unplanned and ad hoc self-modification or to the influence of other helpers occurred occasionally but, in general, these were not major difficulties. Altogether. however, we were impressed by the high amount and consistency of data produced by persons who were essentially untutored in data-collection methods.

Evaluation

The results have shown the Procedure to have a number of desirable characteristics. It provides for orderly and systematic behavior modification for cases that may be encountered in the open setting; there was a high degree of effectiveness for problems progressing to the point of modification; although some conditions interfered with case activity, these influences were rarely a serious threat to the behavior modification; positive changes in contracted behavior were not accompanied by an increase in negative changes for nontargeted behavior; there were more positive than negative changes in nontargeted behavior incidental to case activity in targeted behavior; and other services and occasional crises could be managed with only temporary delay in orderly progress in the Procedure.

However, the results did disclose some potential threats to successful behavior modification in the open setting. Attrition and client inaccessibility were higher than desirable, and noncompliance with the behavior regimen disrupted successful work in several cases, and there was at least some noncooperativeness for many of the cases. These areas deserve more attention.

Work with the Procedure has indicated clearly that in addition to the general procedural steps specified, it is necessary to have specialized procedures for handling particular difficulties. Occasions for the use of more specialized procedures involve work on family communication and decision-making, sexual difficulties, crises, and transitional life situations. Additional work should be done to develop, explicate, and codify the specialized procedures that may assist in handling particular difficulties in the context of a more general procedural framework such as the one proposed here.

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Coping with Anger and Aggression in Mourning

Paul C. Rosenblatt, Douglas A. Jackson, and Rose P. Walsh

It is not uncommon for people who are bereaved to be angry and even to engage in violent acts. In behavioristic language, the death of someone close to an individual or important to him blocks completion of many response sequences and deprives one of reinforcements; this frustration disposes one to anger and aggression. The social control of this anger and aggression is a problem to be solved in any society, and one possibility is to use ritual specialists who do a variety of things that may limit anger and aggression.

Specialists may function in one or more of the following ways: to satisfy frustrated dependency needs; to reduce the occurrence of frustrations in addition to those stemming directly from the death, thereby reducing the likelihood of an angry explosion by the bereaved; to provide ritual activity for the bereaved so that time gets filled with things to do; or to define the inchoate early feelings of grief as something inconsistent with anger.

The value of ritual specialists in controlling anger and aggression seems particularly important up to and including the initial body disposal. During that period the loss is most salient, the means of coping with it least clear or least accepted by the bereaved, and the emotional feelings experienced by the bereaved least likely to have been defined. Hence, we believe that the more important ritual specialists are in the period up to and including initial body disposal, the less will anger and aggression be expressed by the bereaved.

An alternative to the reduction of anger and aggression through the use of ritual specialists is to channel anger and aggression toward institutionalized targets. Across culture, targets for such anger and aggression include oneself, other people in the community, outgroupers, inanimate objects, animals, and the presumed killer of the deceased.

If social relations are to be preserved in societies with institutionalized anger and aggression, there must be mechanisms for heading off noninstitutionalized violence against others. We have identified two customary practices which could serve protective functions and which, if we are right about the need for such customs and their effectiveness, should be associated with institutionalized anger and aggression by the bereaved.

One custom is isolation or seclusion of the bereaved. Obviously, if a bereaved person is in seclusion, interacting minimally with few people, the opportunities for attack on others are minimal.

A second custom is marking of the bereaved. If bereaved persons are set off from others by special dress, hair style, facial markings, or other signs indicating their bereaved status, others may be continually reminded to be careful in interaction with them. Their carefulness may reduce the frequency of instigation to anger or aggression.

It may be that both marking and isolation of the bereaved serve other functions, particularly in recruiting assistance to the bereaved and in enhancing the performance of mourning roles. These alternative functions may also contribute to the control of anger and aggression by providing need satisfaction and reducing frustration stemming from uncertainty about

what to do.

The Cross-Cultural Study

To achieve a sample of adequately described societies we searched the *Standard Cross-Cultural Sample* and a delineation of world sampling provinces. We chose societies in such a way as to maximize independence of cases and amount of information available; the final sample contained 78 societies.

Extracts—We copied materials relevant to death customs and the correlates of interest, focusing on the sources, communities, and time periods indicated in the Ethnographic Atlas of the journal called *Ethnology*.

Ratings—Key ratings were made for four different variables: aggression, marking, isolation, and ritual specialists. In order to be included in the final analysis, a variable had to be rated with substantial interrater correlation and had to survive several validity tests.

All of our measures are based on pooled ratings involving simple averaging for the measures of marking of bereaved parents and of amount done by ritual specialists. For the other marking measures and for the isolation measures—all of which were rated present-absent—cases were dropped on which raters disagreed. For anger and aggression measures, which were also rated present-absent, we averaged ratings, counting cases of rater disagreement on presence-absence as intermediate between agreed-upon presence and agreed-upon absence.

Because of the limitations of ethnographic reports of death customs, for all variables reported on in this paper there is a substantial reduction in number of cases from the original 78 societies. We suspect that people in societies with a great deal of violence-proneness at a death might make it risky for an ethnographer to observe death customs in detail.

Findings

We have decided to present data from the measure on which we have the largest number of cases, somebody is institutionalized target, which correlated perfectly with all but one of the other measures of anger and aggression, and to present data from measures of institutionalized anger and aggression involving specific types of bereaved persons for whom we have specific isolation and marking ratings.

Ritual specialists—There is a significant negative correlation between the amount done by religious and nonreligious ritual specialists up to and during initial body disposal and our key measure of anger and aggression, somebody is institutionalized target. In fact, the ritual specialists measure correlates negatively with all our measures of anger and aggression. Thus the use of specialists appears to reduce the expression of anger and aggression.

The value of specialists in controlling anger and aggression may stem in part from ritualization, but reduction of contact with the corpse does not seem to be relevant. Although our measure of amount done by ritual specialists correlates significantly with a measure of degree of ritualization of initial funeral activities, it does not correlate with a measure of amount of contact by the most bereaved with the corpse.

There may be factors associated with societal complexity that can explain the relationship of ritual specialists and aggression. Ritual specialists are associated significantly with size of local community, an indicator of societal complexity. It is possible that in complex societies dependence on any single person is less than in simple so-

cieties, hence less emotionality at a death. Complex societies may more often have theological belief systems which reduce emotionality during bereavement, or they may more often socialize from infancy or childhood onward to suppress emotionality. There is a need for future research to winnow alternative interpretations.

Isolation and marking—Isolation of widows correlates significantly with widow attacks some institutionalized target and widow attacks self as institutionalized target. Isolation of widowers correlates significantly with widower attacks some institutionalized target. Isolation of adult offspring mourning for own parents does not correlate significantly with adult offspring attacks some institutionalized target or somebody is institutionalized target, and isolation of parents mourning for subadult offspring does not correlate significantly with parents attack some institutionalized target or somebody is institutionalized target. In fact, isolation of adult offspring occurs in only three of 34 societies for which we have ratings, and isolation of parents mourning for subadult offspring occurs in only three of 36 cases for which we have ratings. By contrast, widows are isolated in 19 of 40 cases and widowers are isolated in 12 of 36 cases. Perhaps aggressive emotional reactions are more intense for bereaved spouses than for bereaved parents and adult offspring, or perhaps isolation is more burdensome to a society when it has to be applied to the many infant and childhood deaths and the deaths of each elderly parent, some of whom would have many surviving children. Perhaps also frustration and consequent disposition to anger and aggression are less when people who are less productive economically die.

Marking of widows correlates significantly with widow attacks self and somebody is institutionalized target. For parents of deceased subadult offspring we measured duration of marking, a finer measure than presence-absence, which is the marking measure used for the other categories of mourners. Duration of marking parents correlates significantly with institutionalized attack on something by parents. For the other categories of mourner, marking is not significantly related to anger and aggression. It is especially clear for subadult offspring of the deceased, whose childish aggression can be presumed to be less of a threat to individuals or a community, that marking is not used to control aggression.

Our marking and isolation measures are correlated positively for the different categories of bereaved persons (from a nonsignificant low of .22 for adult offspring of deceased parents to a significant high of .50 for widowers). Nonetheless, there seems some possibility that marking and isolation are partial functional alternatives and there is some suggestion that isolation is a preferred mechanism for dealing with widower aggression, marking a preferred mechanism for dealing with parent aggression. The fact that we obtained no significant correlation for marking or isolation of adult offspring of the deceased may well indicate that the ties between adult offspring and their parents are comparatively tenuous.

Discussion

We have assumed that societies either deal with important problems or get into trouble. We further assumed that anger and aggression during bereavement were important problems and that societies would either have customs that deal with dispositions to anger and aggression or would suffer consequences such as high death rates

and disruption of family relations and alliances. Therefore, societies with institutionalized anger and aggression that lack isolation and marking must either have a functional alternative to isolation and marking or must suffer from a high level of disruption. Moreover, there should be no societies in which ritual specialists are important and patterns of institutionalized anger and aggression are present—unless there are functional alternatives to ritual specialists. To probe the limits of our theoretical analysis, we searched our data for deviant cases.

There is a society in our data with important ritual specialists and with some form of institutionalized anger and aggression—the Egyptian Fellahin (peasants). It would be useful to have more data, but at least it seems that ritual specialists are not always sufficient to eliminate the expression of anger and aggression.

There is only one society in our sample that has institutionalized anger and aggression for a category of bereaved person but lacks both markings and isolation for that category of person—the Cubeo, a small-scale Tucano-speaking people of the northwest Amazon. Examination of the ethnographic materials we have on the society indicates that the Cubeo are plagued with disruptive aggression constituting a serious challenge to the integrity of their communities.

Among the Cubeo, death is often attributed to sorcery. The expression of anger at the sorcerer and the ritual inquest, accompanied by angry funeral orations, constitute the pattern of institutionalized anger. If a specific sorcerer is identified and apprehended following the death, he probably will be killed.

Cubeo sorcery accusations and fears surrounding a death can lead to mounting aggression and disruption of social relations. If the most bereaved persons were isolated, some of the disruptive aggression might be avoided. Disruptive aggression might conceivably be limited in other ways, but apparently it is not for the Cubeo, and the cost of this seems substantial.

Applications

At deaths in the United States, up to and including initial body disposal, ritual specialists, including physicians, clergy, and funeral directors, dominate customs. Anger and aggression are not frequently expressed here, although they are undoubtedly present. It is conceivable that they would be much more frequently expressed and much more intense if ritual specialists were absent.

For people thinking of moving away from customary American funeral services toward do-it-yourself services, our data and theory suggest that there is a risk that anger and aggression might be much more of a problem than they usually are in the United States.

If expression of anger were encouraged early in bereavement, without additional controls, it might lead to problems of snowballing violence. Thus, if catharsis of anger and aggression is encouraged in the United States, it might be well to plan on controlling it either through isolation or through marking—marking in a way that unambiguously indicates bereavement with proneness to anger.

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